

**From:** Whittaker, Laura [laura.whittaker@aptim.com]  
**Sent:** Thursday, August 9, 2018 5:11 AM  
**To:** Liscio, Matthew P CIV SEA 04, NAVSEA DET RASO [matthew.liscio@navy.mil]  
**CC:** Slack, Matthew L CIV SEA 04 04N [matthew.slack@navy.mil]; Howard, Leslie A CIV NAVFAC SW [leslie.howard@navy.mil]; Noble, Kimberly K CIV SEA 04, NAVSEA DET RASO [kimberly.k.noble1@navy.mil]; Johnson, Nels [Nels.Johnson@aptim.com]; Schul, Raymond [raymond.schul@aptim.com]; Guillory, Jeffrey [jeffrey.guillory@aptim.com]; Meldrum, Amy [amy.meldrum@aptim.com]; Hanelt, Norm [Norm.Hanelt@aptim.com]; Killpack, Randall [randall.killpack@aptim.com]; Gerg, David [david.erg@aptim.com]; Chi, Minhsec [minhsec.chi@aptim.com]; Orman, Sean [sean.orman@aptim.com]; Rogers, Bryon [bryon.rogers@aptim.com]  
**Subject:** [Non-DoD Source] Data package ready for review - HPNS PE-2, RSY E1 (Use 8)  
**Attachments:** HPNS APTIM RSY E1 (Use 8) Soil Non-LLRW Concurrence Request 08092018 (reduced).pdf

Mr. Liscio,

APTIM request RASO concurrence to designate this soil as Non-LLRW soil.

If there are any questions or if additional data is required, please contact me.

Thank you.



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200 Fisher Avenue  
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## Hunters Point Naval Shipyard, Parcel E-2 RSY Data Report

Contract No. EMAC III CTO-0013						
RSY Pad: E1	RSY Pad Use Number: USE 8	First Submittal <input checked="" type="checkbox"/>	Second Submittal <input type="checkbox"/>			
Data attached and submitted by: Laura Whittaker		Data Report Submittal Date: 08/09/2018				

Soil Sample Data						
Sample Identification	Survey Location	Type of Sample	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>60</sup> Co Final Analytical Results (pCi/g)	Total Sr Final Analytical Results (pCi/g)
		Upper limit of site reference background	1.633	0.113	0.252	0.331
PE2-RSYE1-U8-S001	1	Systematic	0.486	-0.0481	0.0302	-0.0137
PE2-RSYE1-U8-S002	2	Systematic	0.594	0.00237	0.0121	N/A
PE2-RSYE1-U8-S003	3	Systematic	0.449	-0.00163	0.0193	N/A
PE2-RSYE1-U8-S004	4	Systematic	0.458	-0.0161	0.0517	N/A
PE2-RSYE1-U8-S005	5	Systematic	0.0374	-0.0238	0.0166	N/A
PE2-RSYE1-U8-S006	6	Systematic	0.590	-0.0749	0.0420	N/A
PE2-RSYE1-U8-S007	7	Systematic	0.612	-0.0326	0.00416	N/A
PE2-RSYE1-U8-S008	8	Systematic	0.388	0.0182	-0.036	N/A
PE2-RSYE1-U8-S009	9	Systematic	0.533	0.0177	-0.0234	N/A
PE2-RSYE1-U8-S010	10	Systematic	0.401	-0.0453	-0.0903	N/A
PE2-RSYE1-U8-S011	11	Systematic	0.270	0.0212	-0.1060	-0.000571
PE2-RSYE1-U8-S012	12	Systematic	0.472	-0.00159	0.0422	N/A
PE2-RSYE1-U8-S013	13	Systematic	0.454	0.0244	0.0126	N/A
PE2-RSYE1-U8-S014	14	Systematic	0.403	-0.0751	-0.0442	N/A
PE2-RSYE1-U8-S015	15	Systematic	0.495	-0.0198	0.0259	N/A
PE2-RSYE1-U8-S016	16	Systematic	0.609	-0.0312	0.0156	N/A
PE2-RSYE1-U8-S017	17	Systematic	0.456	-0.0422	-0.0175	N/A
PE2-RSYE1-U8-S018	18	Systematic	0.404	0.000	-0.0918	N/A

<sup>137</sup>Cs Cesium-137  
<sup>60</sup>Co Cobalt-60  
<sup>226</sup>Ra Radium-226  
Sr Strontium  
pCi/g Picocuries per gram

Instrument and Survey Data										
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #	Reference Area Static Bkgd	Reference Area Static 3σ IL	Reference Area Scan Bkgd	Reference Area Scan 3σ IL	Range
RSI Gamma Walkover Survey	HPRS-07022018-PE2-ROV2-2691	07/02/2018	RS-701/RSX-1	N/A	Console: 7236 Detectors: 5447,5448	N/A	N/A	3,400 CPS	4,872 CPS	2,971-3,751 CPS
RSI Follow-up Static Survey	HPRS-07062018-PE2-JSS2-2717	07/06/2018	RS-701/RSX-1	N/A	Console: 7236 Detectors: 5447,5448	3,612 CPS	4,255 CPS	N/A	N/A	3,259-3,732 CPS
Systematic Sample Survey	HPRS-06292018-PE2-JSS-2687	06/29/2018	2221	07/12/2018	271439	15,783 CPM	18,714 CPM	N/A	N/A	13,762-15,292 CPM

3σ IL Investigation Level (established at 3σ above the mean of the Reference Area dataset)

CPS Counts per second

CPM Counts per minute

Summary
1) RSI gamma walkover survey and data review—upon review of initial scan data, follow-up static investigations were deemed necessary, and investigation locations were identified as per the RSI Data Evaluation Process (pages 3-4). Gamma scan coverage is shown on the Systematic Sample Survey map (page 8). Contour maps of scan data are shown on RSI Data Plots (page 5). Data review results are summarized on RSI Review Summary (page 6).
2) RSI Follow-up static survey—18 locations identified during the data review process were investigated, with readings less than the Reference Area static IL at all locations for regions of interest (ROIs) 3, 6, 7, 8, and 9 (VD1). Follow-up locations are shown on the RSI Follow-up Static Survey map (page 7).
3) Eighteen systematic soil samples (001-018) were obtained and submitted for gamma spectroscopy analysis. Sample locations for systematic samples are shown on the Systematic Sample Survey map (page 8). TestAmerica sample results are attached (pages 30-53).  Ten percent of the systematic soil samples (two samples in total, PE2-RSYE1-U8-S001 & PE2-RSYE1-U8-S011) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 30-53).
<b>Conclusions:</b>  All locations with elevated Z-scores identified by the RSI gamma walkover survey were determined to be consistent with background. 18 locations were investigated during the follow-up static survey, with readings less than the Reference Area static IL at all locations for ROIs 3, 6, 7, 8, and 9 (VD1). Spectral analysis results and gamma static data for each region of interest (ROI) are provided (pages 9-26).  Final analytical results for systematic samples from this RSY pad are concluded to be comparable to background. Histograms showing soil sample activity concentrations are provided (pages 27-29). Ten percent of the systematic soil samples (two samples in total, PE2-RSYE1-U8-S001 & PE2-RSYE1-U8-S011) were also analyzed for total strontium, with concentrations less than the Project Action Limit of 0.331 pCi/g, as shown in the Soil Sample Data table (page 1).  RSY E1 (Use 8) contains soil from Survey Unit areas undergoing revetment construction.  APTIM request RASO concurrence to release this soil as Non-LLRW. Disposition: This soil shall be dispositioned as non-LLRW waste to be stockpiled onsite following appropriate chemical characterization.

## RSI Data Evaluation Process

### RS-700 Mobile Radiation Monitoring System

- Self-contained gamma-ray radiation detection and monitoring system
- (2) RSX-1 4-liter NaI(Tl) gamma detectors oriented perpendicular to the direction of travel (VD1 denotes both detectors summed; VD3 refers to the left detector; and VD4 refers to the right detector)
- Multi-Channel Analyzer, allowing for monitoring of energy-specific regions of interest (ROIs)
- RadAssist survey software for control, monitoring, and recording

Ten ROIs have been established for radium and progeny, cesium, and cobalt, as well as other naturally-occurring or anthropogenic gamma-emitting radionuclides that may be of interest:

ROI	Description	Energy Range (keV)	Primary Peak (keV)
1	Total counts	411 – 2811	N/A
2	Potassium	1371 – 1569	1460
3	U/Ra-226	1659 – 1860	1764 (Bi-214)
4	Thorium	2409 – 2811	2614 (Tl-208)
5	Annihilation	456 – 570	511
6	Ra-226	546 – 666	609 (Bi-214)
7	Cs-137	600 - 720	662
8	Pb-214/Ra-226	327 – 399	351
9	Co-60	1085 - 1370	1173/1332
10	Gross Counts	24 – 2811	N/A

A tiered approach is used during data review to identify follow-up locations. Raw data are exported to a comma delimited format using RadAssist and imported into an Excel spreadsheet for review and analysis. The following review steps are completed to determine if additional follow-up measurements are necessary:

- **Playback Review:** The data file is replayed in RadAssist and reviewed for elevated count rates in ROIs 6, 7, 9, and 10 for virtual detector (VD) 1 (both detectors summed). The scan screen is also monitored for elevated count rates and alarms.
- **Count Rate Time Series Review:** The count rates for ROIs 6, 7, 9, and 10 for VDs 1, 3 (detector 1), and 4 (detector 2) are plotted in a time series and reviewed for additional peaks in count rate.
- **All ROIs:**
  - **Z-Scores:** The Z-Scores are calculated for each location in all ROIs for VDs 1, 3, and 4. Any location with four or more ROIs having a Z-Score greater than three ( $Z>3$ ) is marked for follow-up.
  - **Local Z-Scores:** Local Z-Scores are calculated using a moving average for each data point in all ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with four or more ROIs having a local  $Z>3$  is marked for follow-up.
  - **Semi-local Z-Scores:** Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with four or more ROIs having a semi-local  $Z>3$  is marked for follow-up.
- **ROIs 3, 6, 8, and 10 (radium-specific ROIs):**
  - Z-Scores: The Z-Scores are calculated for each location in the radium-specific ROIs for VDs 1, 3, and 4. Any location with three or more radium-specific ROIs having a  $Z>3$  is marked for follow-up.
  - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in the radium-specific ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a local  $Z>3$  is marked for follow-up.
  - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise

be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a semi-local  $Z > 3$  is marked for follow-up.

- **ROI 7 (cesium-specific ROI):**
  - Z-Scores: Z-Scores are calculated for each location in ROI 7 for VDs 1, 3, and 4. Any location having a  $Z > 3$  is marked for follow-up.
  - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 7 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local  $Z > 3$  is marked for follow-up.
  - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 7 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local  $Z > 3$  is marked for follow-up.
- **ROI 9 (cobalt-specific ROI):**
  - Z-Scores: Z-Scores are calculated for each location in ROI 9 for VDs 1, 3, and 4. Any location having a  $Z > 3$  is marked for follow-up.
  - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 9 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local  $Z > 3$  is marked for follow-up.
  - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 9 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local  $Z > 3$  is marked for follow-up.
- **Z-Score Time Series Review:** The three types of Z-Scores for ROIs 6, 7, 9, and 10 for VDs 1, 3, and 4 are plotted in a time series and reviewed for additional peaks in Z-Scores.

Any location selected for follow-up or with a Z-Score  $> 3$  in a radium-, cesium-, or cobalt-specific ROI will undergo spectral analysis to determine if it is statistically likely that there are ROC concentrations present at that location in quantities greater than background.

A background spectrum is subtracted from the local spectral data for a given location, and the resulting net spectrum is plotted. Critical levels, as defined in Section 6.7.1 of the Multi Agency Radiation Survey and Site Investigation Manual are calculated and plotted based on background levels. The critical level is the level, in counts, at which there is a statistical probability (with a predetermined confidence) of incorrectly identifying a measurement system background value as greater than background. Any response above this level is considered to be greater than background. The critical level is calculated for ROIs 6, 7, 8, and 9 according to the equation shown below:

Where:

$$L_C = 2.33\sqrt{B}$$

LC	=	critical level (counts)
B	=	average background in the ROI

When count rates in the net gamma spectrum at a given location do not exceed critical levels for any radium-, cesium-, or cobalt-specific energy ranges, it is unlikely that ROC concentrations exist at that location above background.

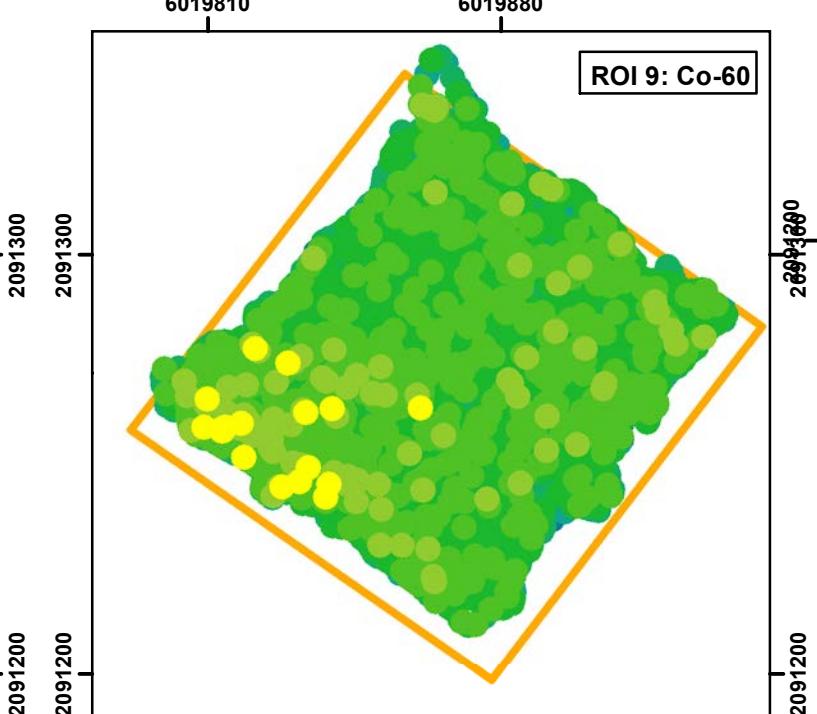
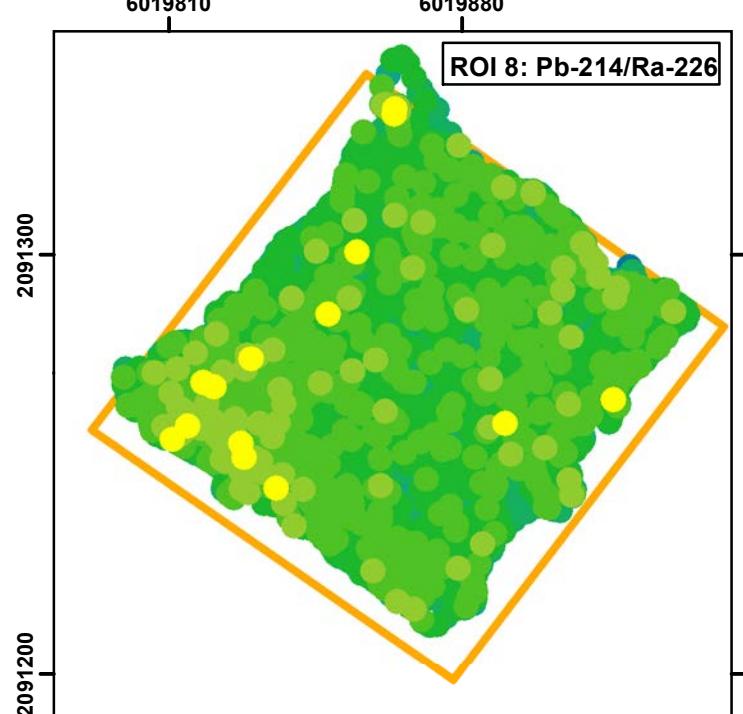
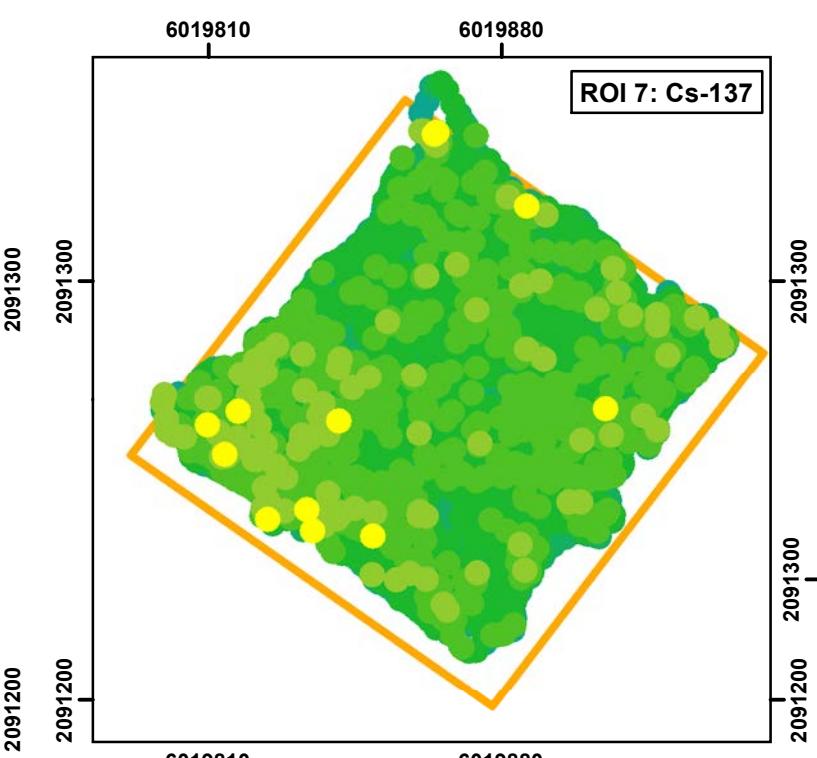
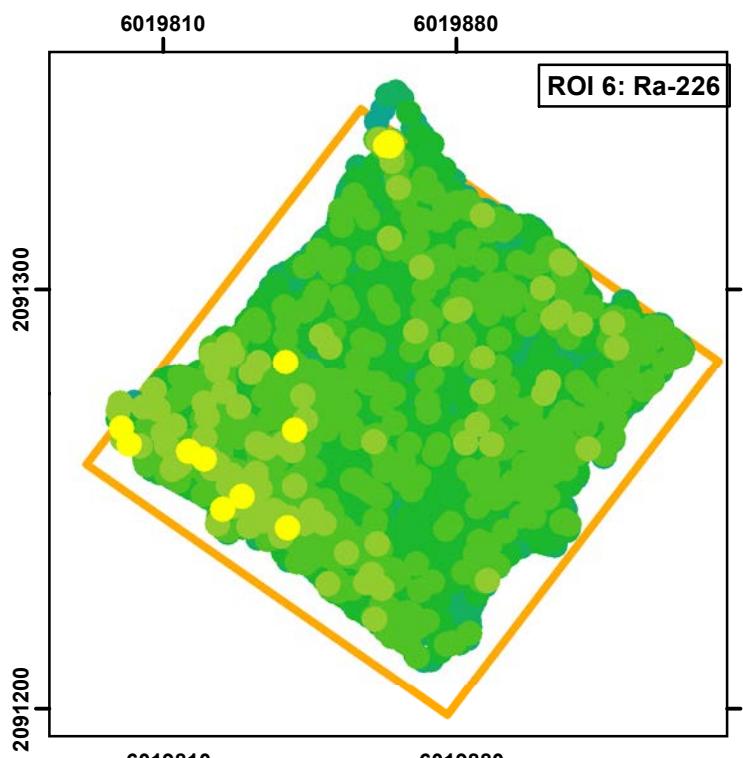
Any data point that is both above the critical level and within the energy range of a given ROI is considered above background for that radionuclide and will be flagged for further investigation in the field.

**RSI Data Plots**  
**HPNS Parcel E-2**  
**RSY Pad E1 (Use 8)**

Page 5 of 53

Contour Map

Soil Excavation Site:  
Revetment Spoils



**RS-700 Gamma Walkover Survey Data (VD1)**

- > 3 std dev
- > -1 to < 0 std dev
- > 2 to < 3 std dev
- > -2 to < -1 std dev
- > 1 to < 2 std dev
- > -3 to < -2 std dev
- > 0 to < 1 std dev
- < -3 std dev

RSY Pad Boundaries

0    20    40    80  
Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



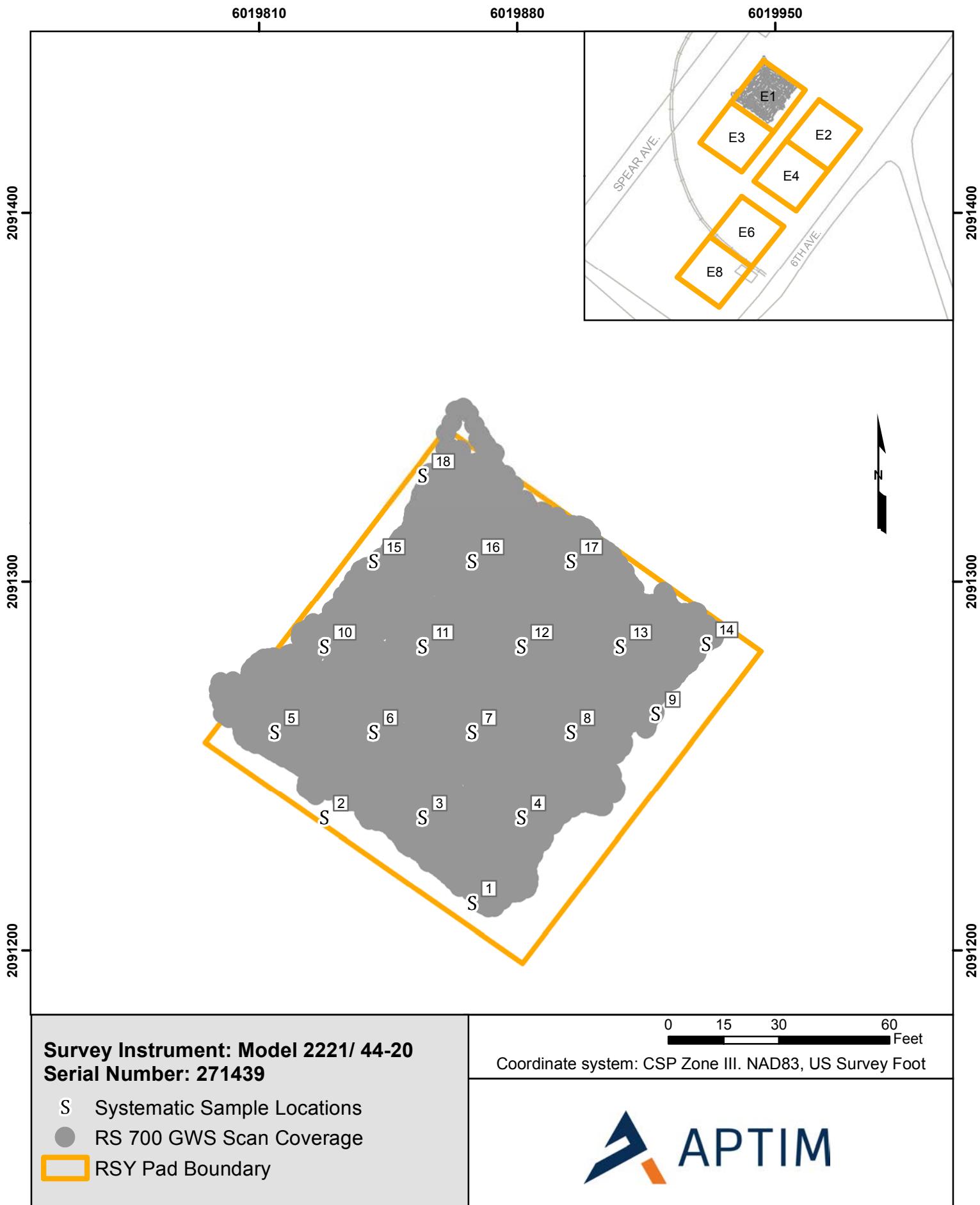
## RSI Review Summary

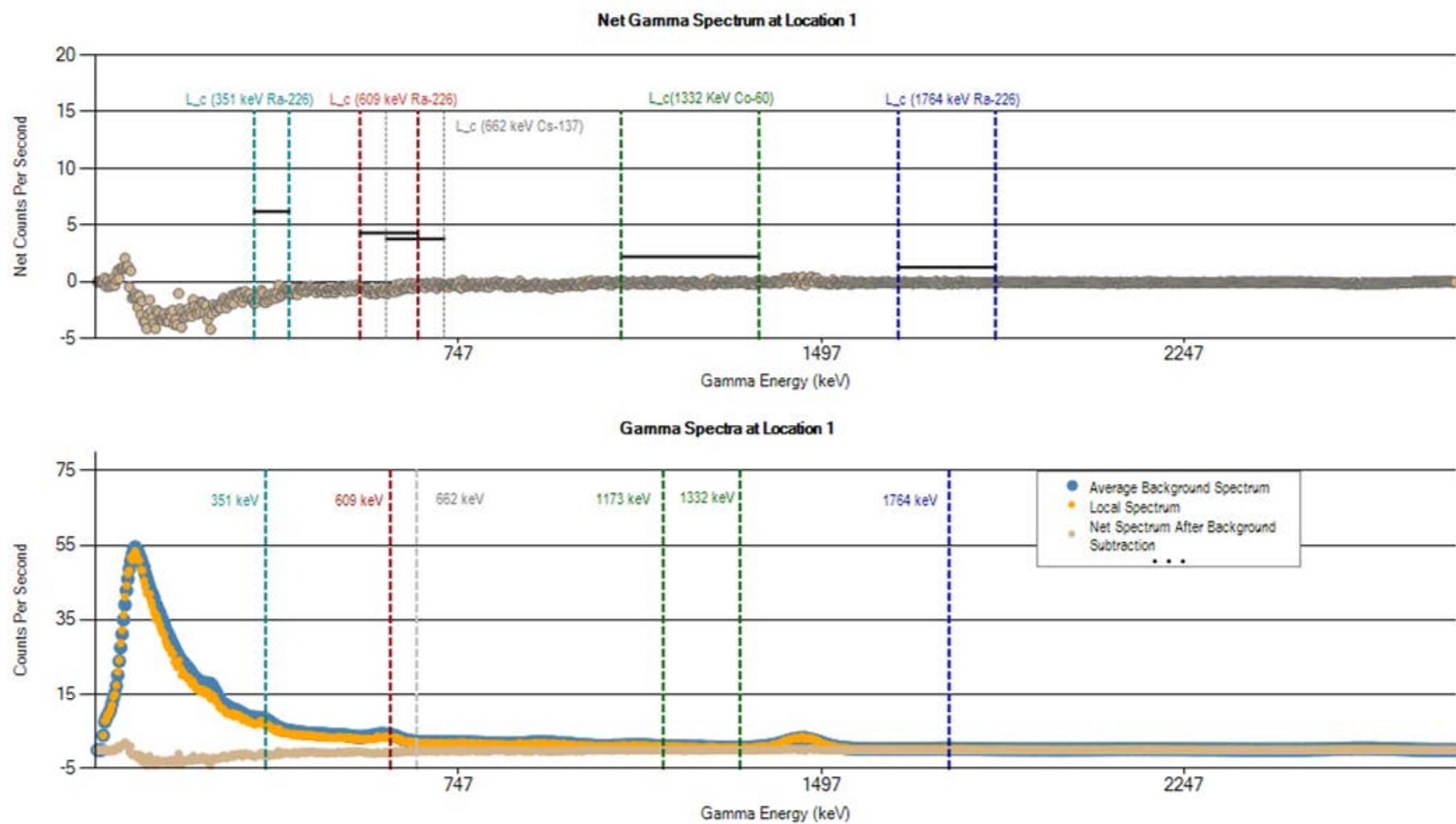
### **Summary:**

18 locations were initially selected for follow-up investigation. Locations were identified by elevated peaks noted in the playback review and/or time series charts, and by using the Z-Score, Local Z-Score, and Semi-Local Z-Score reviews as described in the RSI Data Evaluation Process on pages 3-4. Spectral analyses performed on gamma static data at these locations do not indicate the presence of  $^{226}\text{Ra}$ ,  $^{137}\text{Cs}$ , or  $^{60}\text{Co}$  above background. Gamma static readings at these locations are less than the Reference Area static IL for ROIs 3, 6, 7, 8, and 9; figures are provided on pages 9-26.

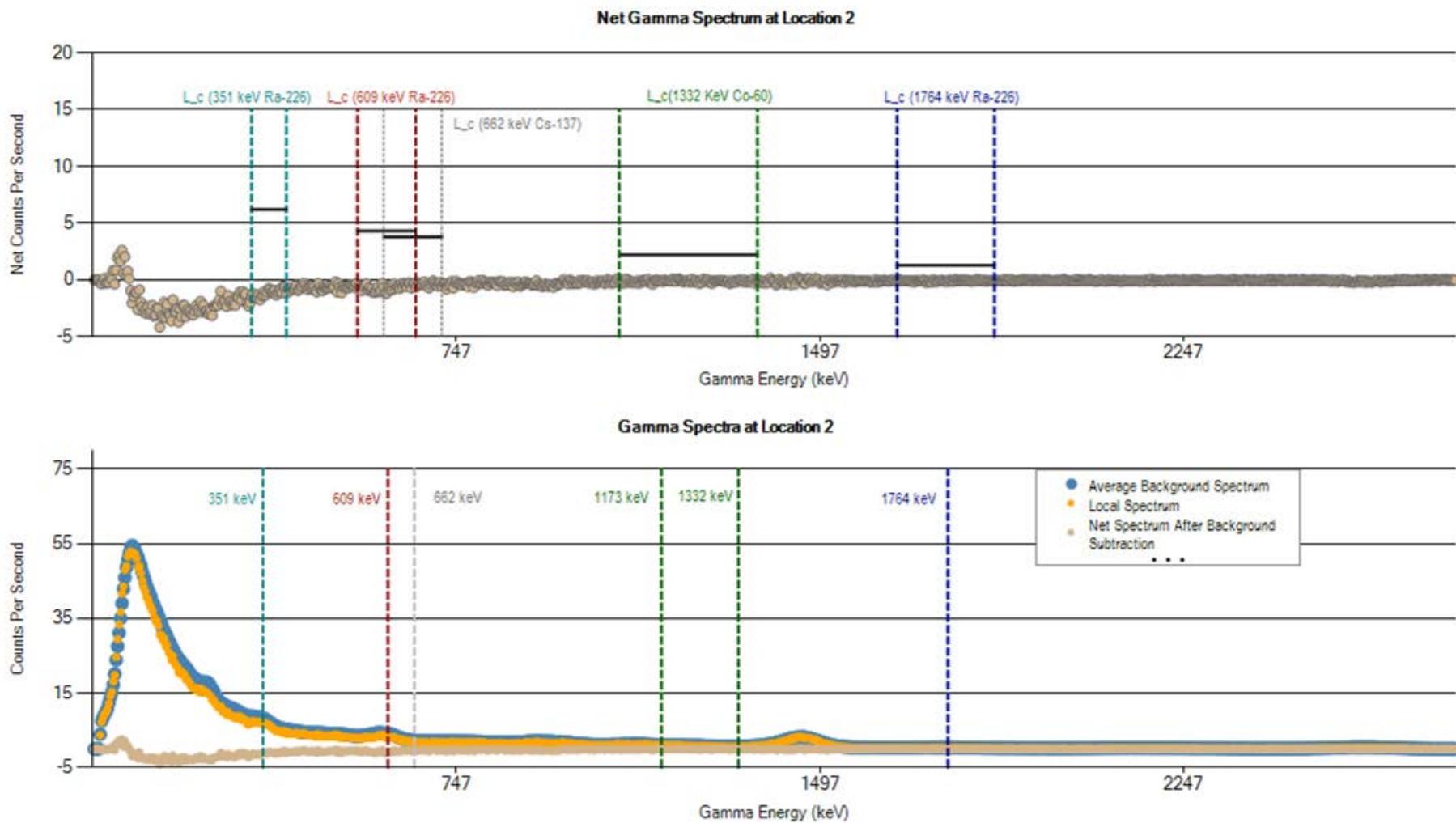
**HPNS Parcel E-2**  
**RSY Pad E1 (Use 8)**



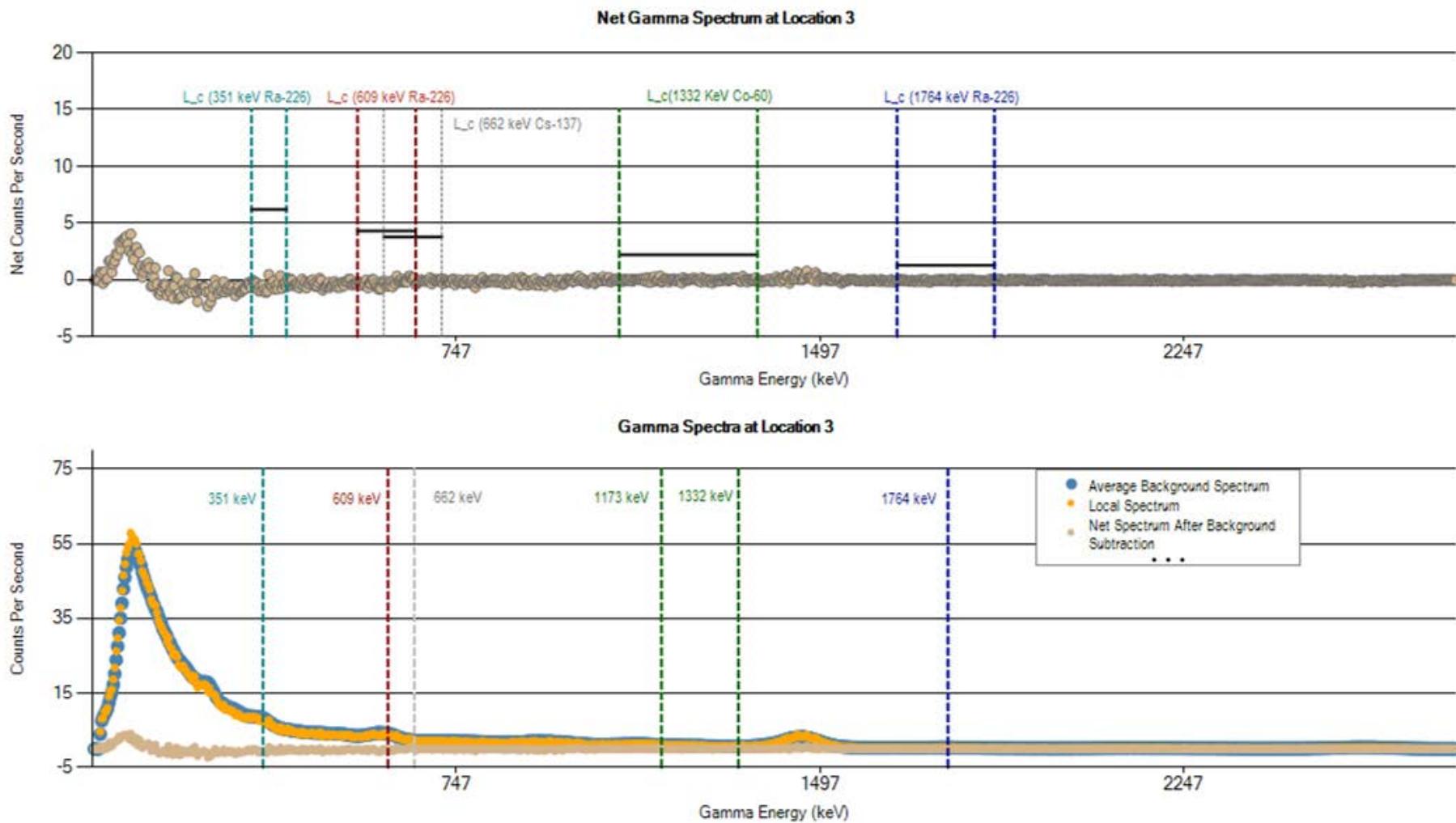




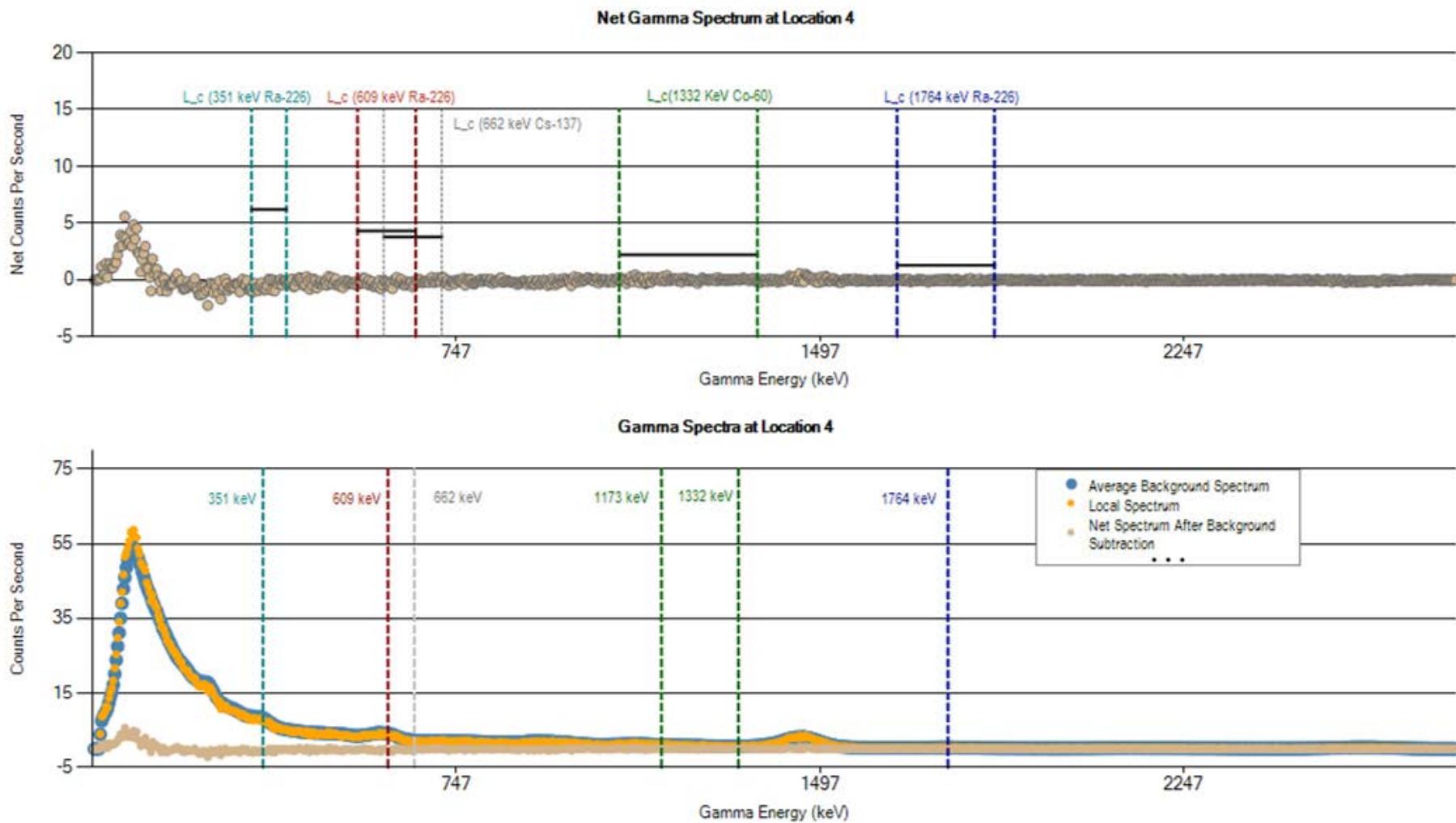
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Location 1 (cps)	733	116	15	16	124	114	91	145	80	3266
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



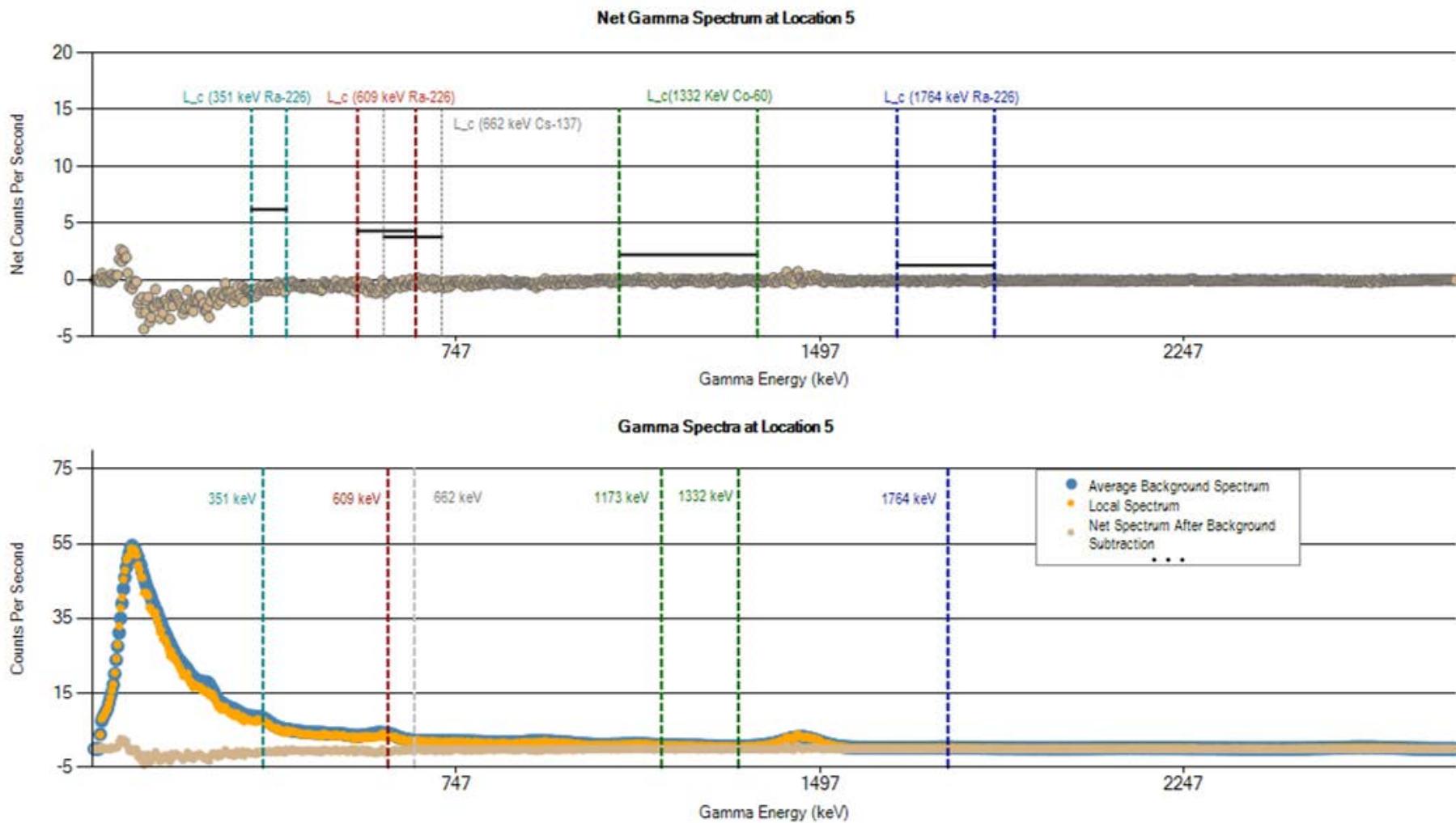
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Location 2 (cps)	718	108	15	17	126	113	87	146	78	3259
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



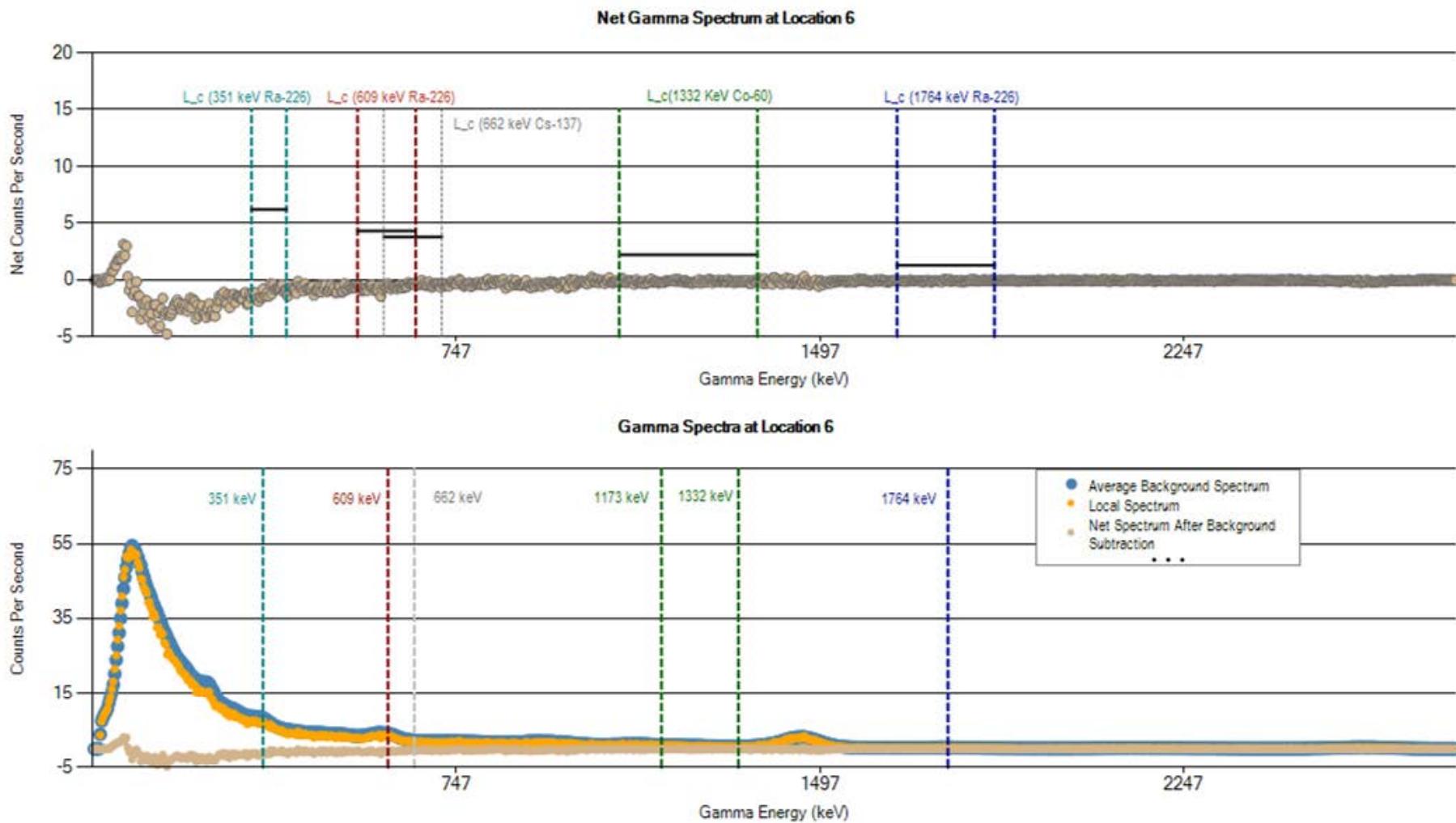
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Location 3 (cps)	805	120	17	18	138	131	104	163	89	3558
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



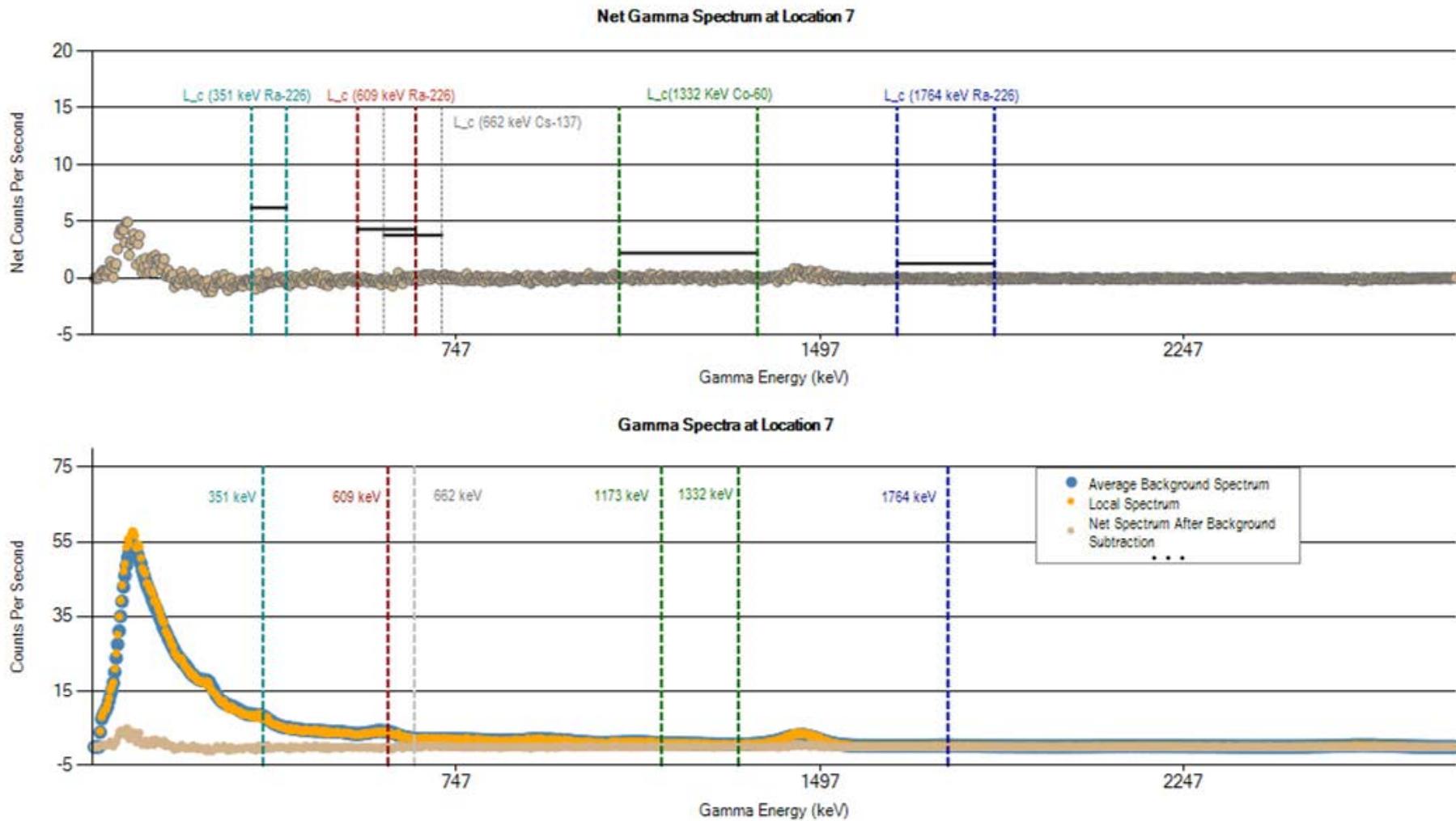
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Location 4 (cps)	810	117	18	19	142	129	101	164	90	3601
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



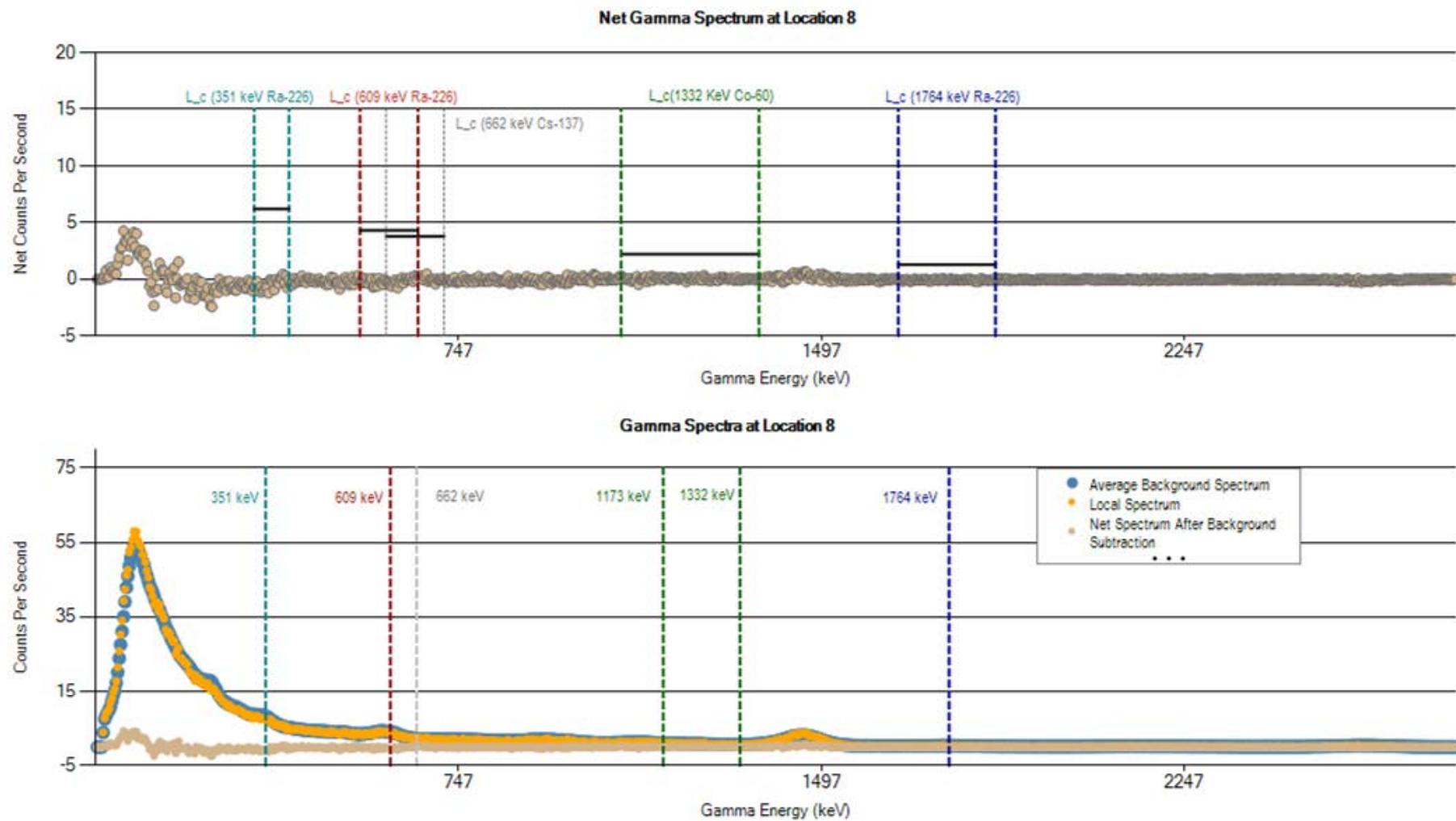
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Location 5 (cps)	754	116	16	18	131	118	92	155	84	3353
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



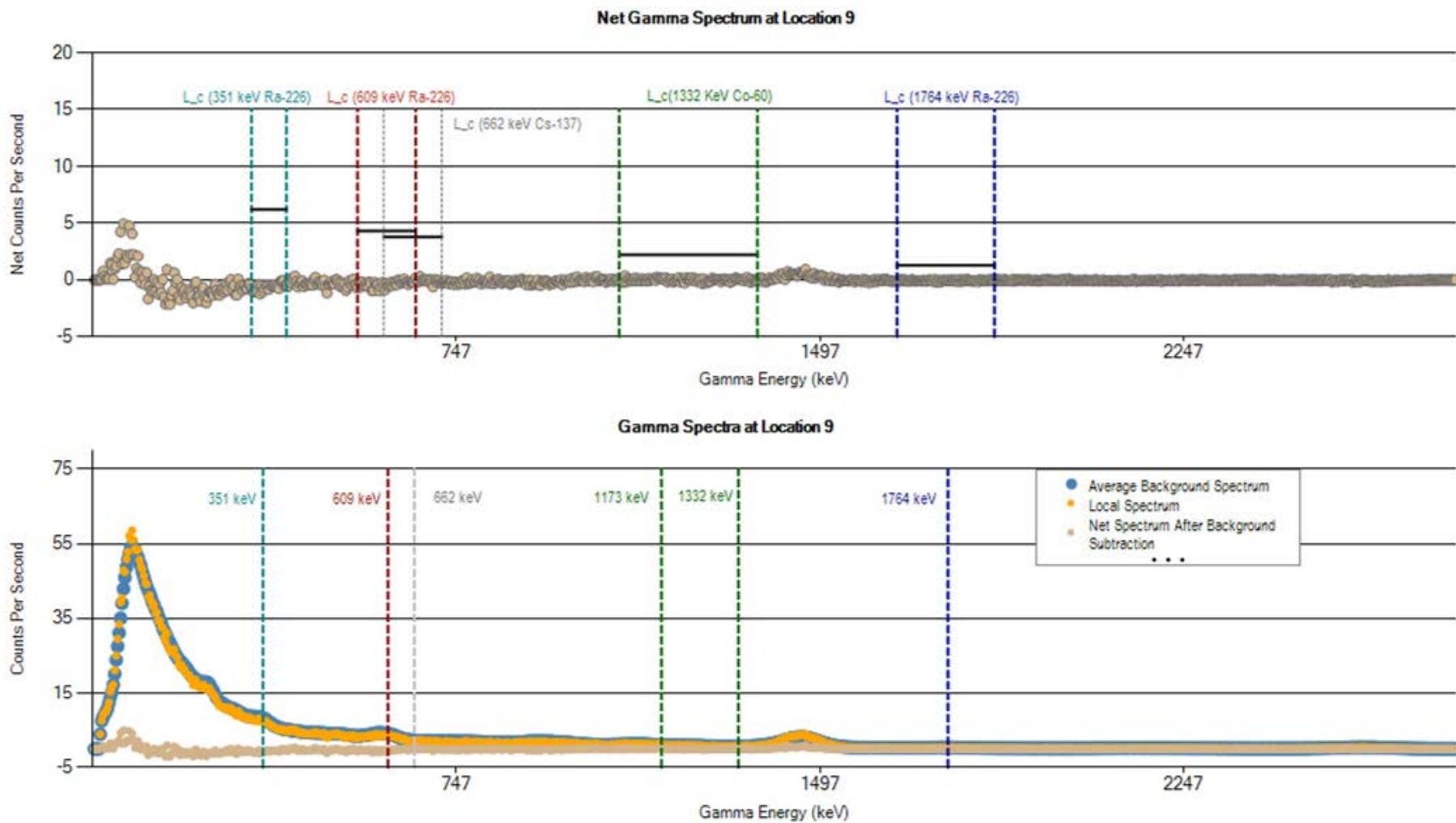
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Location 6 (cps)	711	106	15	16	122	114	88	147	76	3268
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



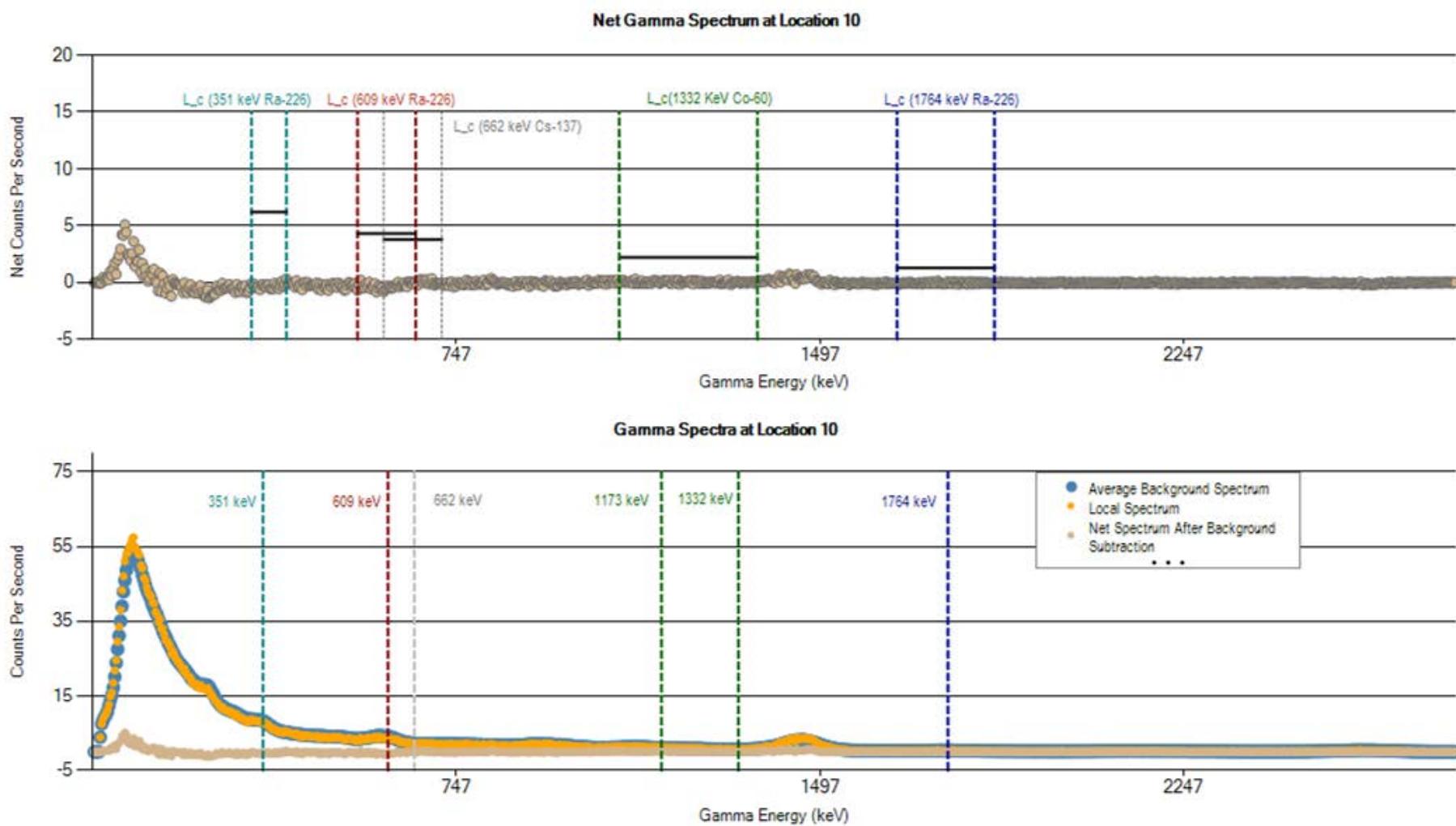
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Location 7 (cps)	841	125	18	20	146	134	107	168	91	3653
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



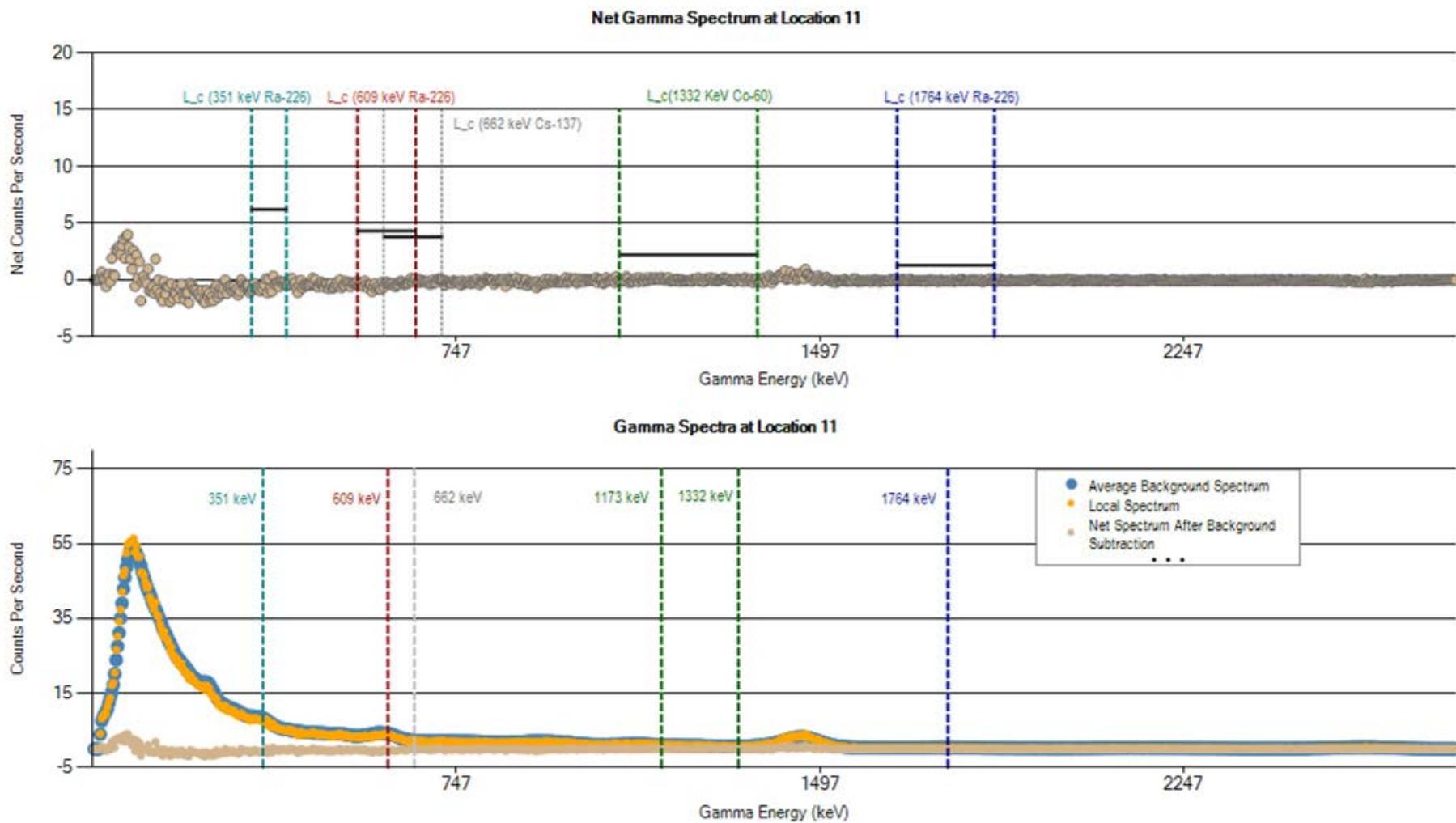
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Location 8 (cps)	827	124	16	18	144	133	104	164	91	3591
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



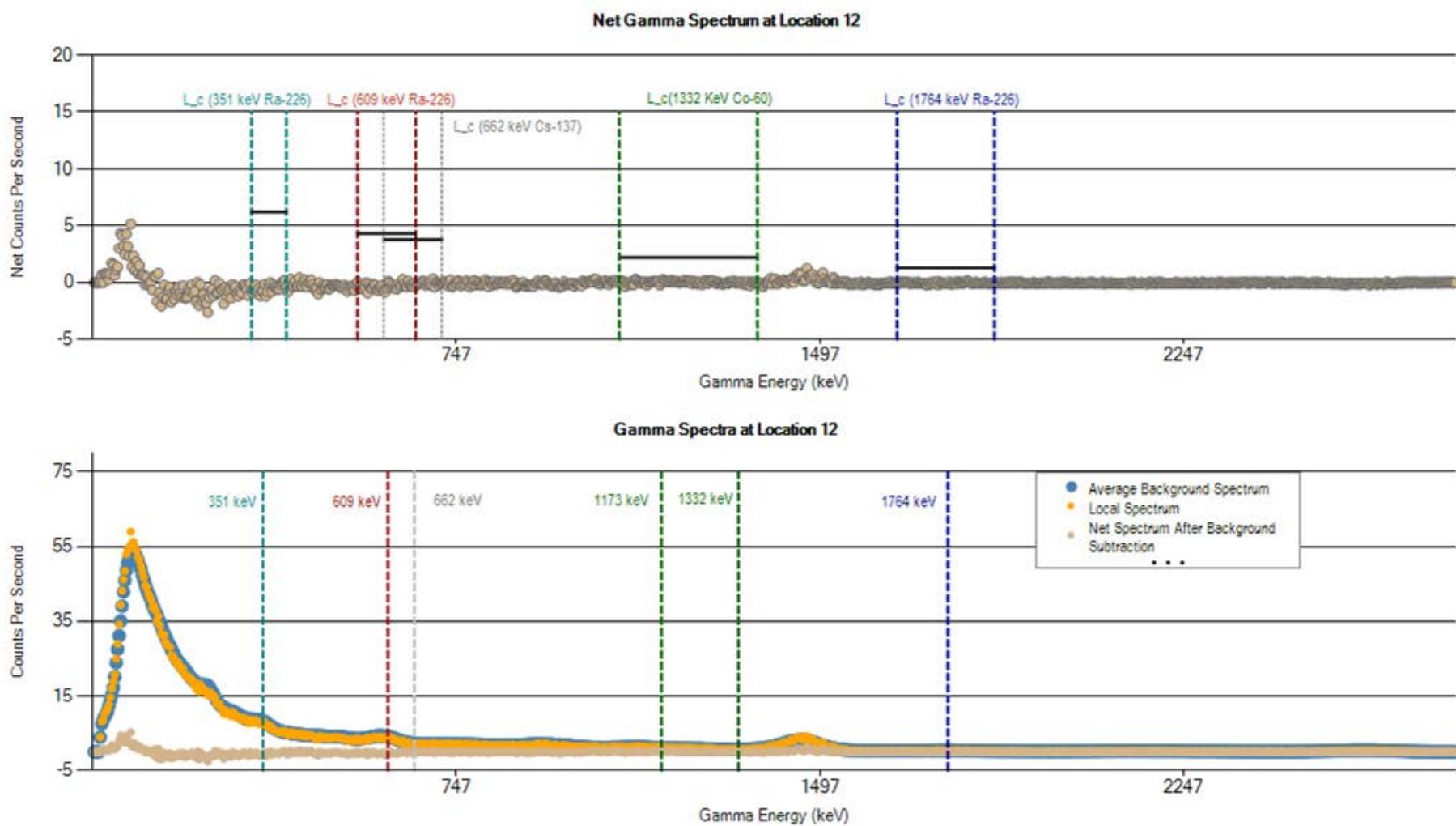
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Location 9 (cps)	808	129	17	19	138	127	100	159	89	3527
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



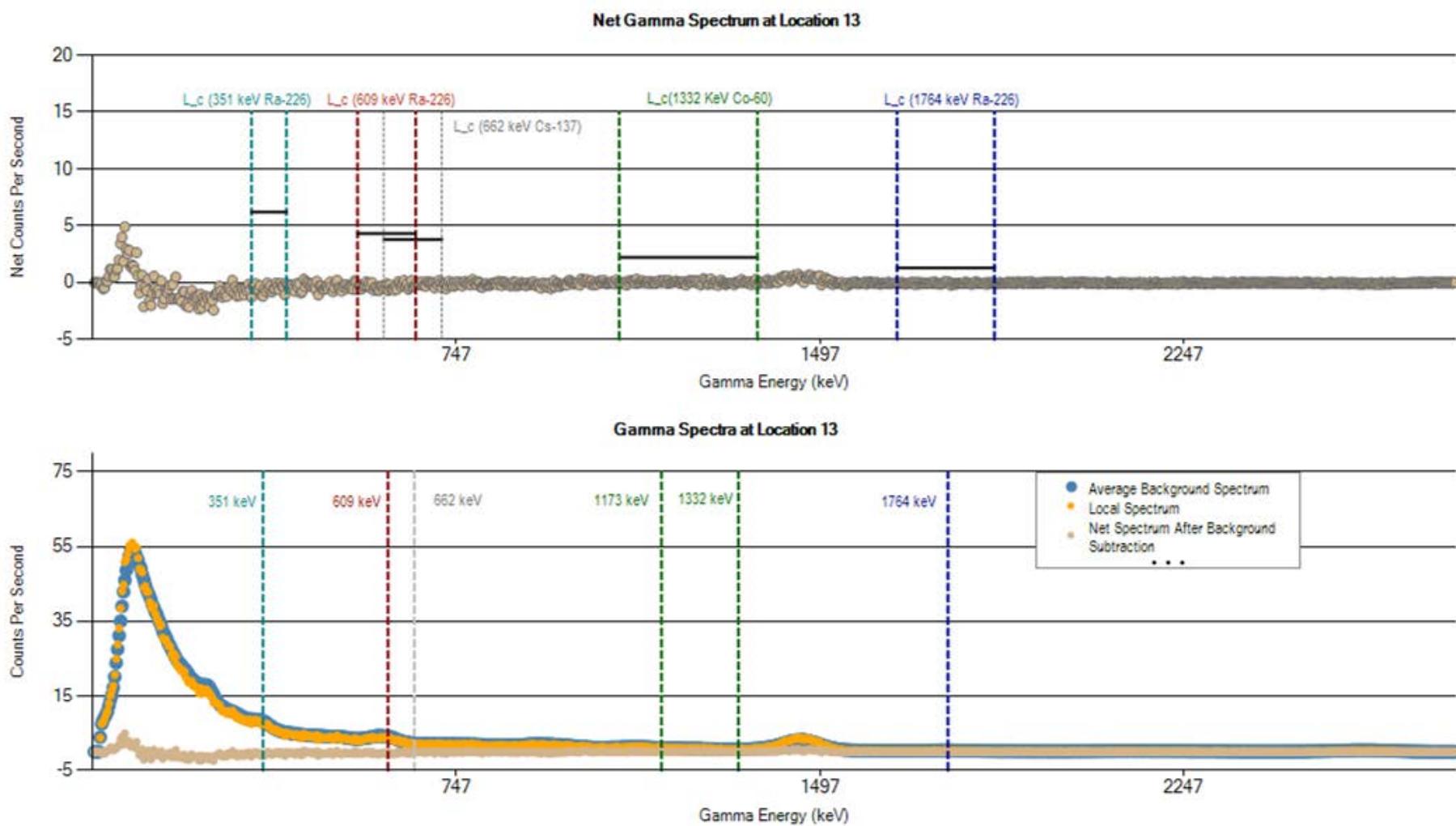
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Location 10 (cps)	829	127	18	19	140	129	103	167	93	3603
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



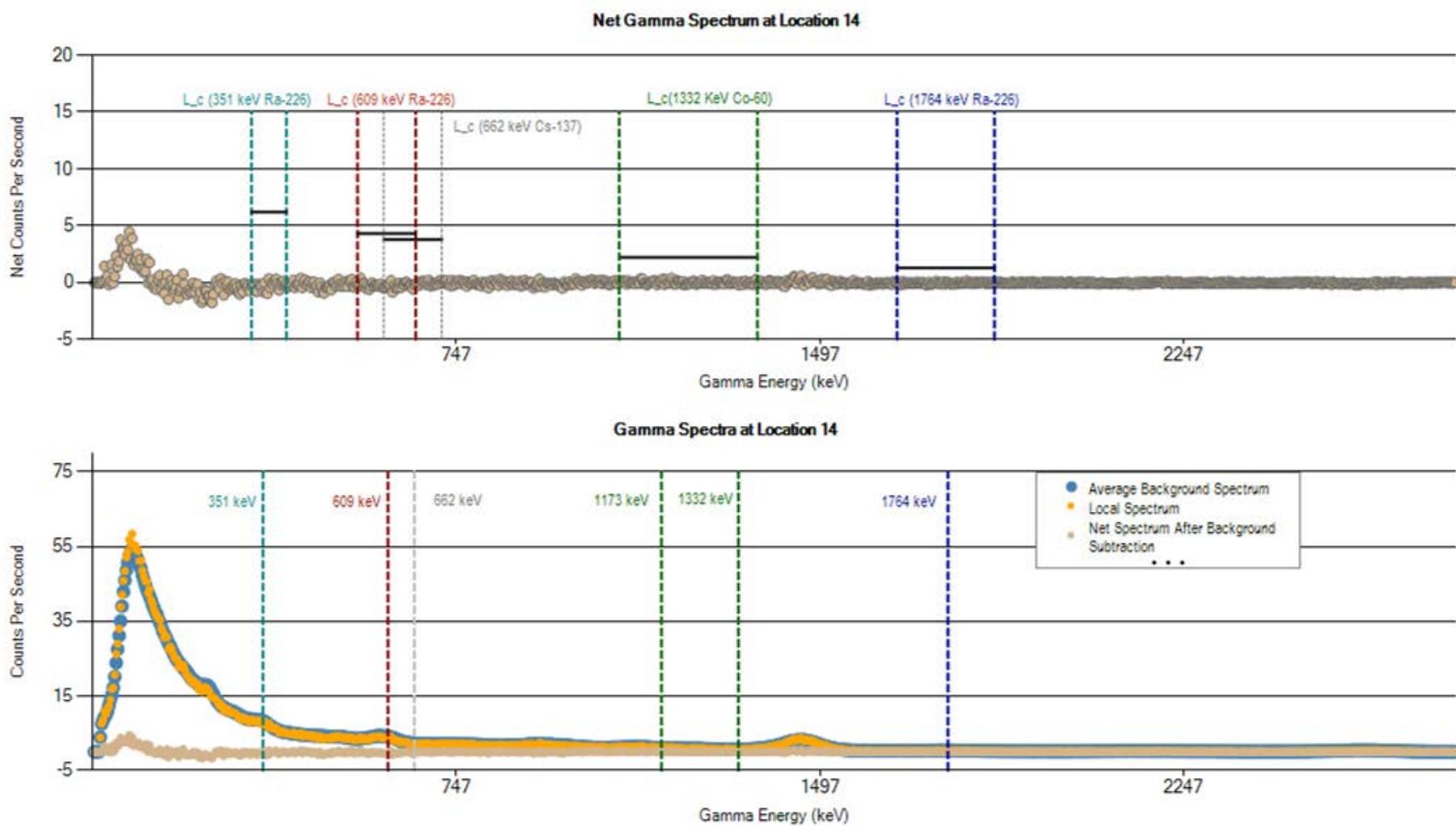
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 11 (cps)	800	124	17	18	137	126	100	163	90	3517
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



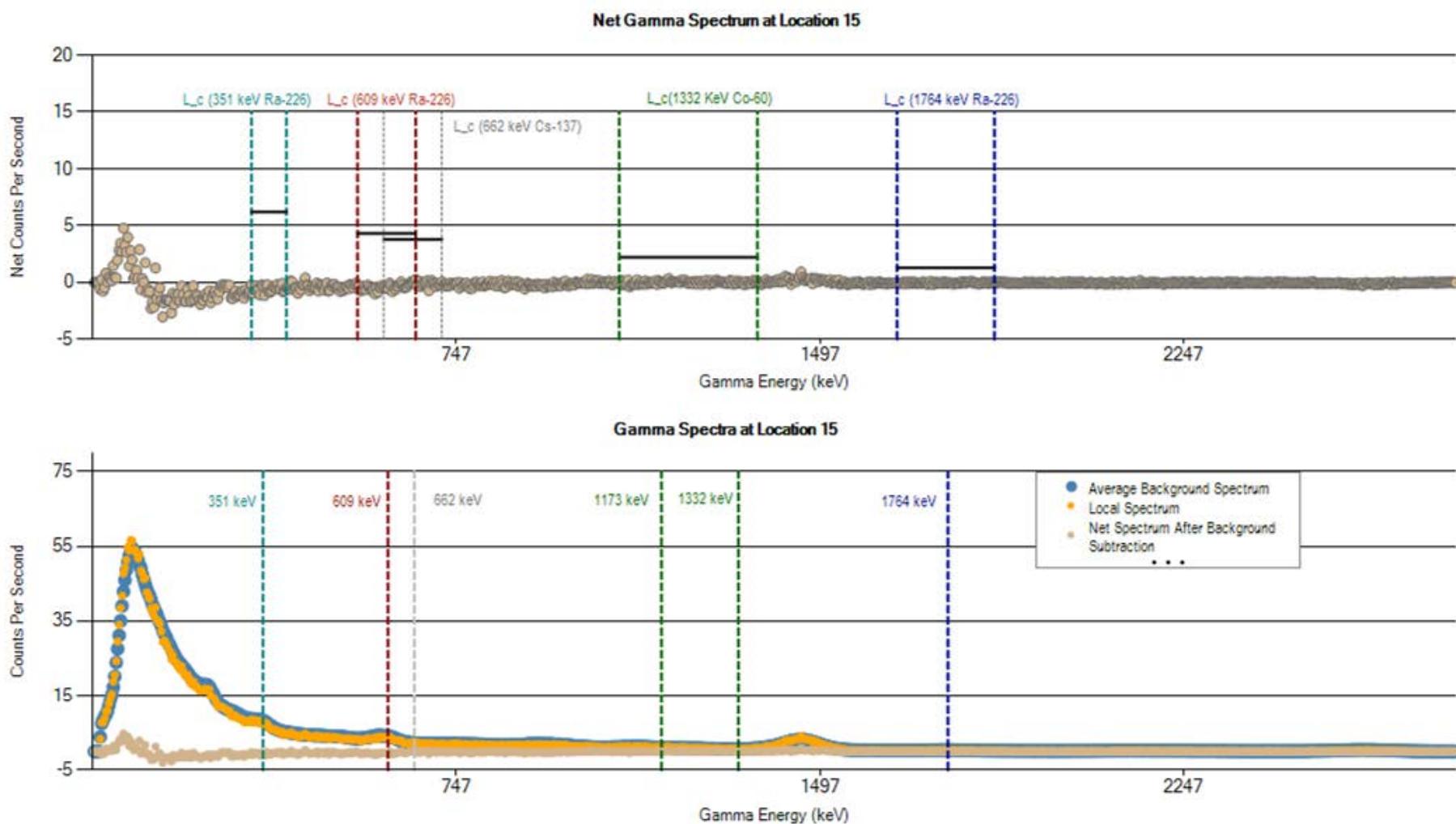
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 12 (cps)	815	127	18	18	136	127	101	162	90	3552
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



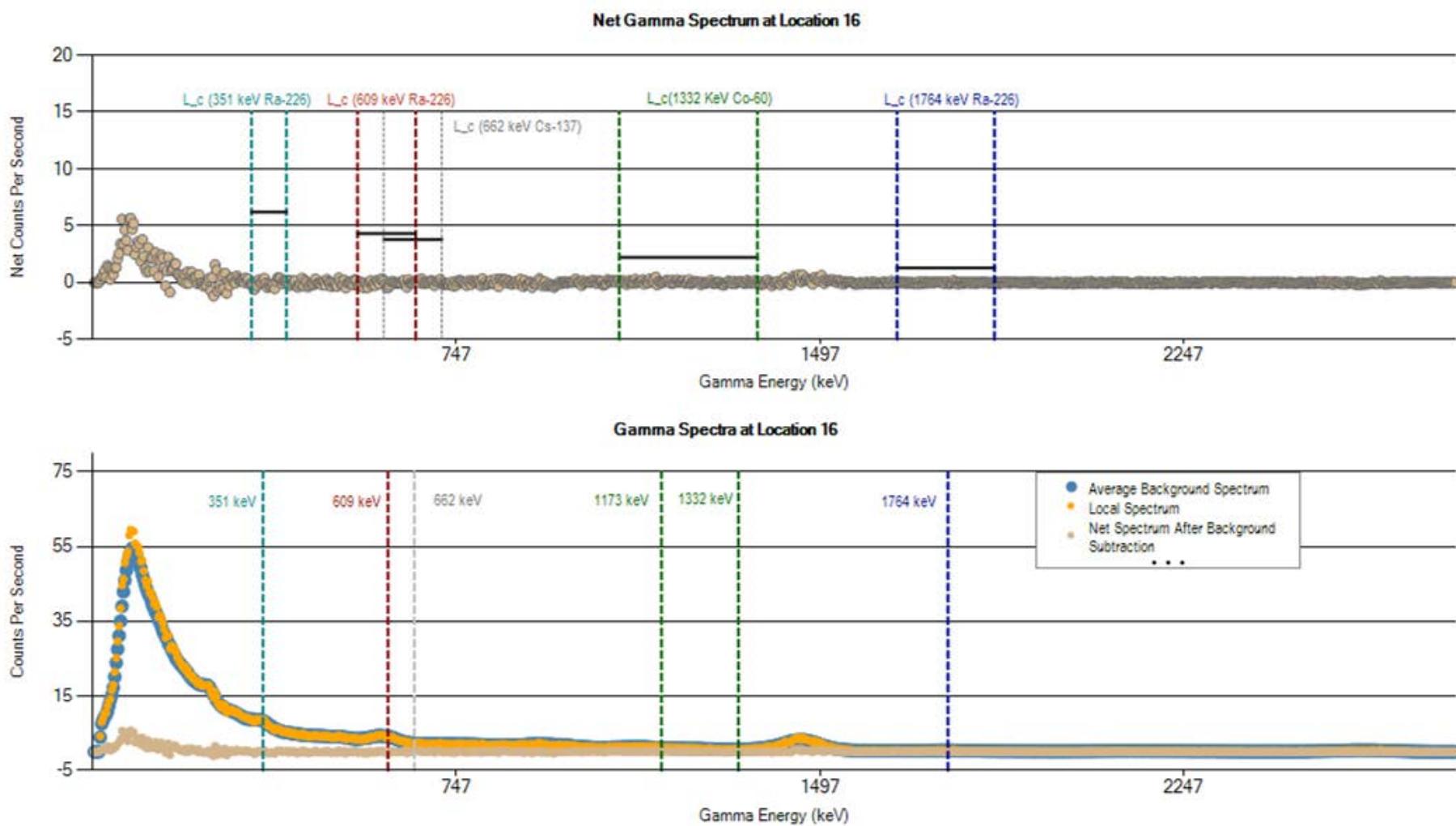
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 13 (cps)	811	128	16	19	138	127	99	163	90	3516
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



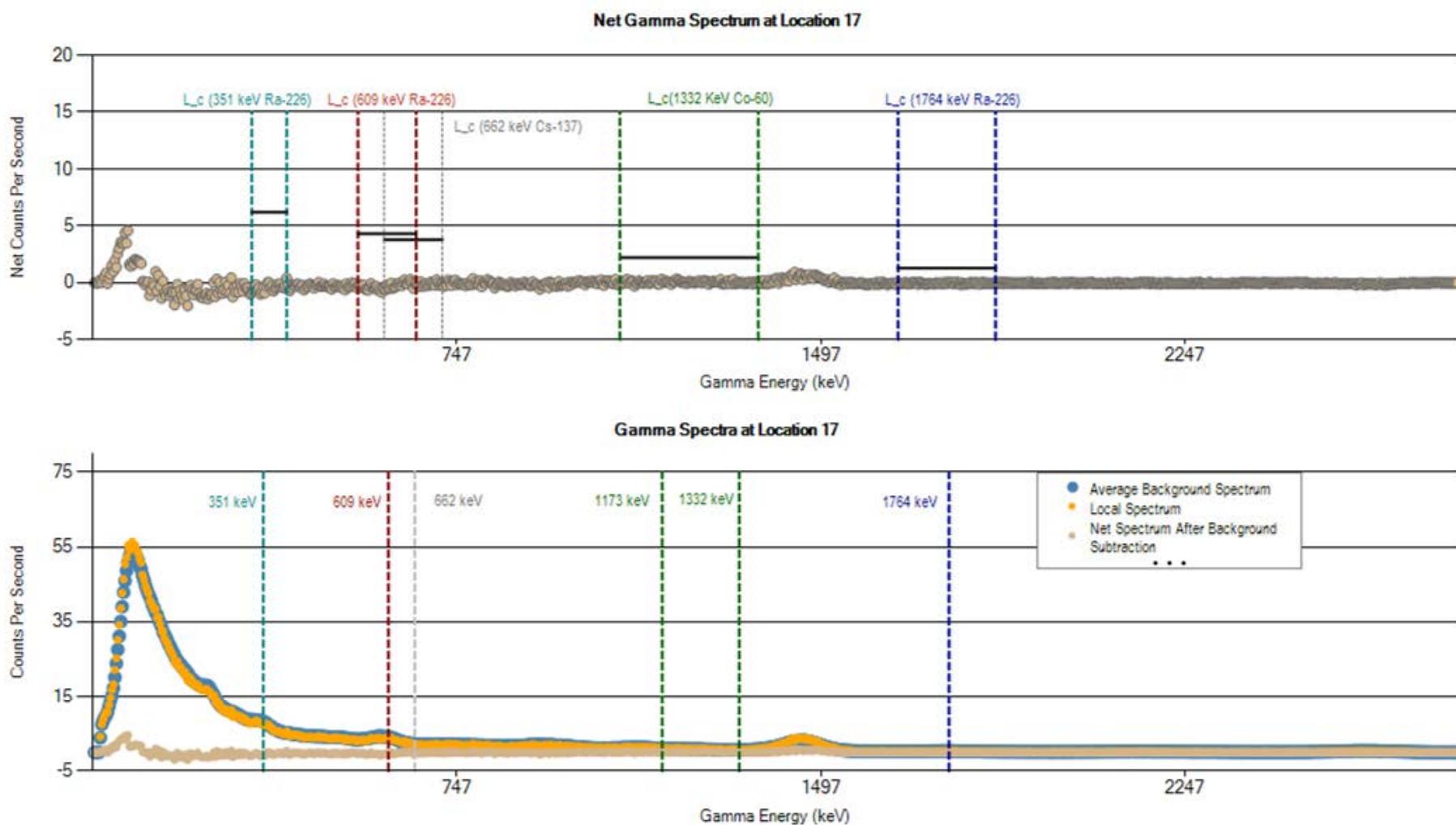
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 14 (cps)	820	118	18	19	142	130	101	168	89	3590
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



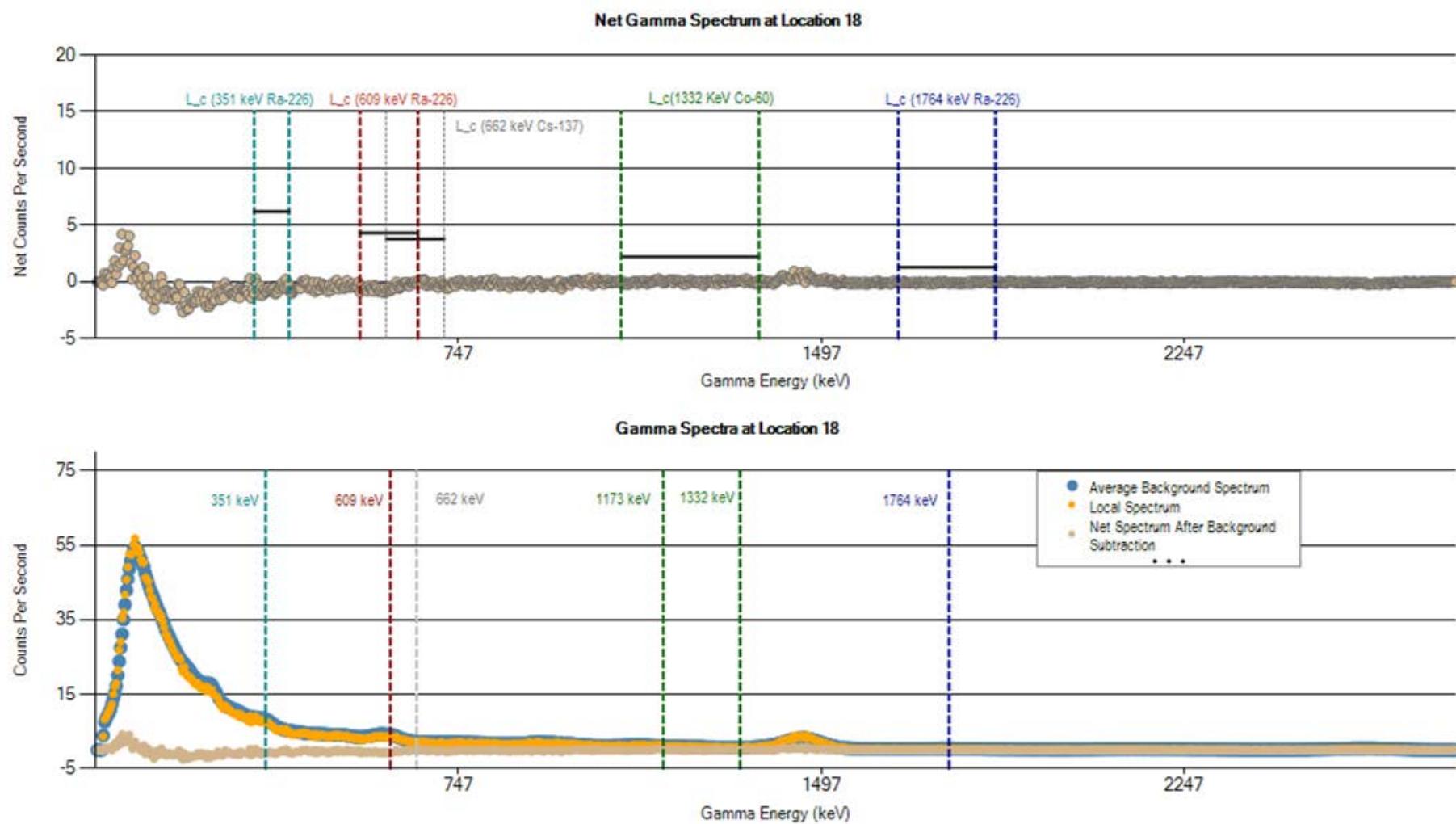
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 15 (cps)	794	123	18	17	135	125	99	160	89	3494
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 16 (cps)	857	123	20	21	149	138	107	174	92	3732
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 17 (cps)	826	132	17	18	140	129	101	165	94	3575
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 18 (cps)	795	125	16	17	135	123	98	159	89	3487
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

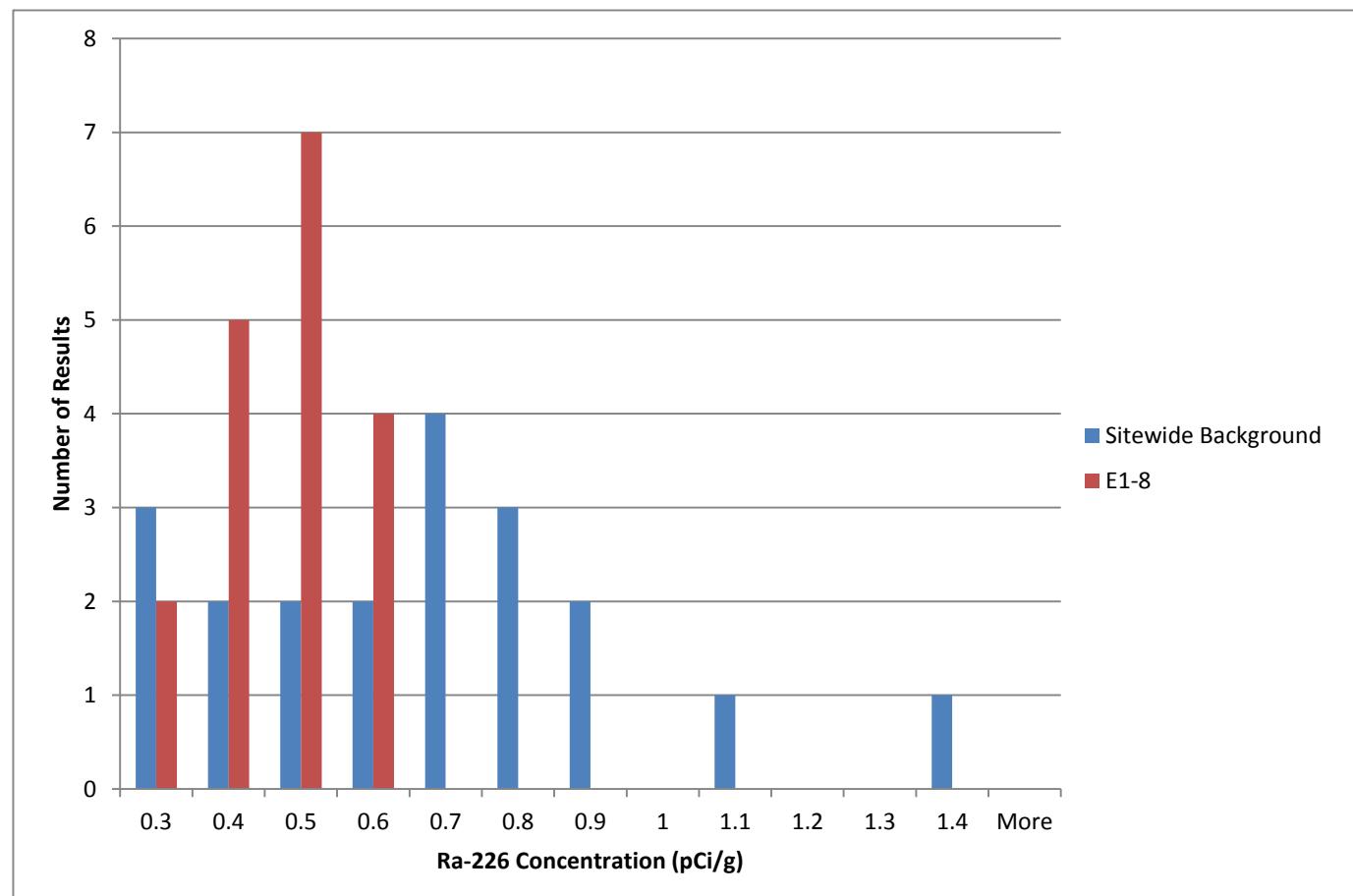
## Histogram, RSY E1 (Use 8) vs. Sitewide Background

## Background

Bin	Frequency
0.3	3
0.4	2
0.5	2
0.6	2
0.7	4
0.8	3
0.9	2
1	0
1.1	1
1.2	0
1.3	0
1.4	1
More	0

## E1-8

Bin	Frequency
0.3	2
0.4	5
0.5	7
0.6	4
0.7	0
0.8	0
0.9	0
1	0
1.1	0
1.2	0
1.3	0
1.4	0
More	0



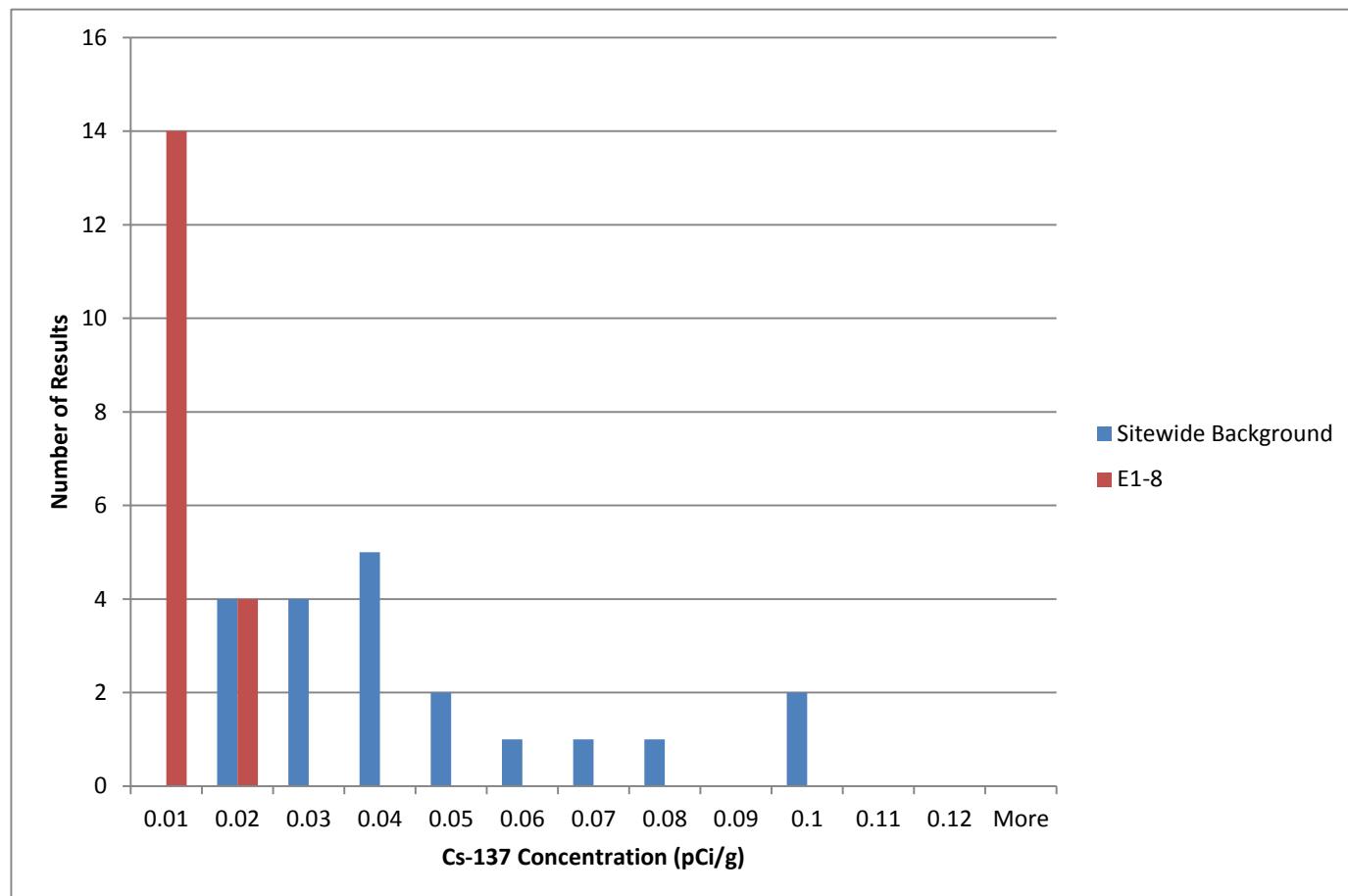
## Histogram, RSY E1 (Use 8) vs. Sitewide Background

## Background

Bin	Frequency
0.01	0
0.02	4
0.03	4
0.04	5
0.05	2
0.06	1
0.07	1
0.08	1
0.09	0
0.1	2
0.11	0
0.12	0
More	0

## E1-8

Bin	Frequency
0.01	14
0.02	4
0.03	0
0.04	0
0.05	0
0.06	0
0.07	0
0.08	0
0.09	0
0.1	0
0.11	0
0.12	0
More	0



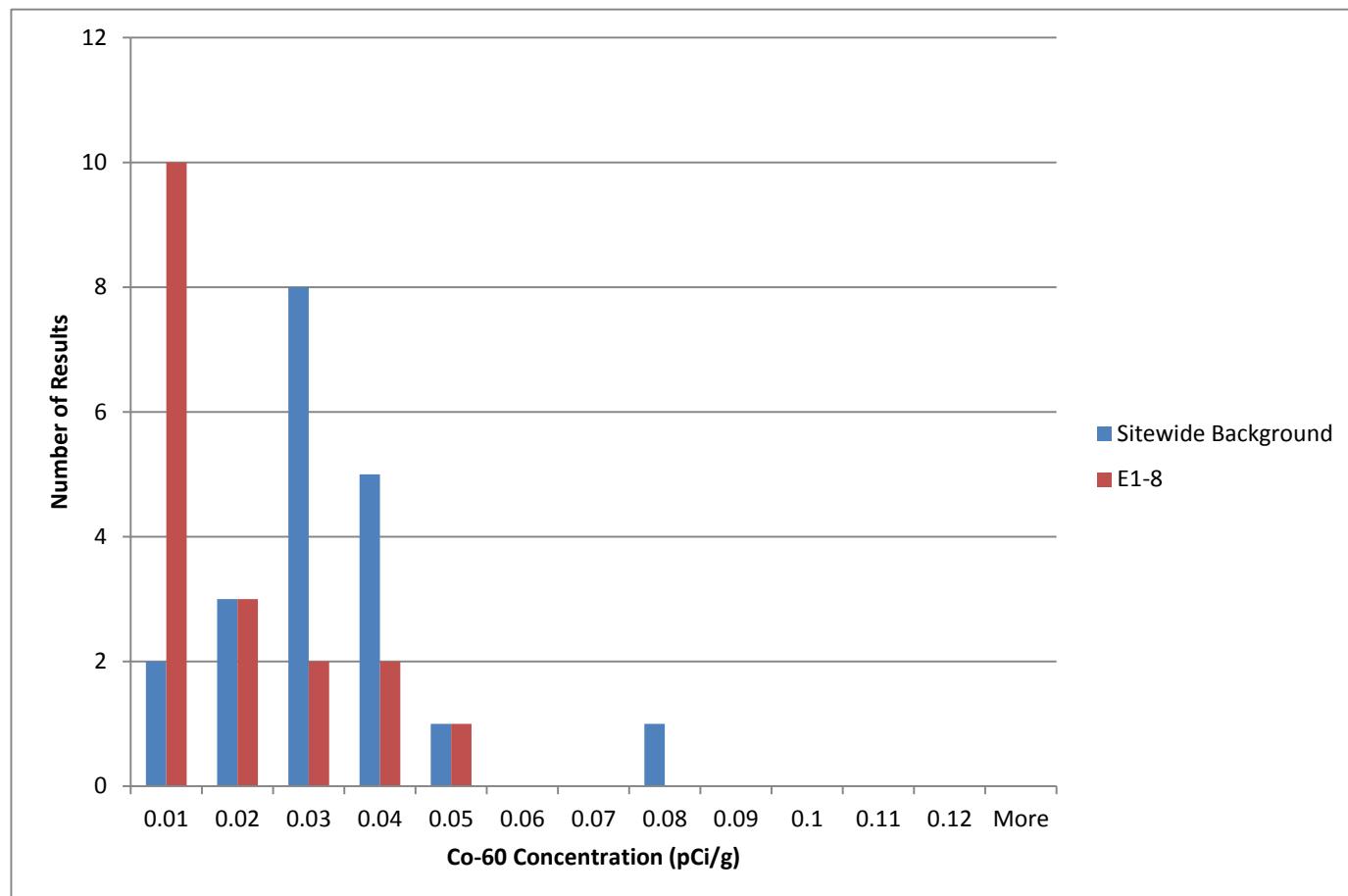
## Histogram, RSY E1 (Use 8) vs. Sitewide Background

## Background

Bin	Frequency
0.01	2
0.02	3
0.03	8
0.04	5
0.05	1
0.06	0
0.07	0
0.08	1
0.09	0
0.1	0
0.11	0
0.12	0
More	0

## E1-8

Bin	Frequency
0.01	10
0.02	3
0.03	2
0.04	2
0.05	1
0.06	0
0.07	0
0.08	0
0.09	0
0.1	0
0.11	0
0.12	0
More	0



# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

TestAmerica Job ID: 160-29332-2

Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:

Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Eddie Kalombo

*Rhonda Ridenhower*

Authorized for release by:

8/2/2018 4:15:58 PM

Rhonda Ridenhower, Manager of Project Management  
(314)298-8566

[rhonda.ridenhower@testamericainc.com](mailto:rhonda.ridenhower@testamericainc.com)

### LINKS

Review your project  
results through

**TotalAccess**

Have a Question?



Visit us at:

[www.testamericainc.com](http://www.testamericainc.com)

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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## Case Narrative

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

**Job ID: 160-29332-2**

**Laboratory: TestAmerica St. Louis**

**Narrative**

### CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: Hunters Point Naval Shipyard - Parcel E2**

**Report Number: 160-29332-2**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup

Method 3620C: Florisil Cleanup

Method 3630C: Silica Gel Cleanup

Method 3640A: Gel-Permeation Cleanup

Method 3650B: Acid-Base Partition Cleanup

Method 3660B: Sulfur Cleanup

## Case Narrative

Client: Aptim Federal Services LLC  
 Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

### **Job ID: 160-29332-2 (Continued)**

#### **Laboratory: TestAmerica St. Louis (Continued)**

Method 3665A: Sulfuric Acid/Permanganate Cleanup

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

#### **RECEIPT**

The samples were received on 07/05/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 19.0 C.

#### **TOTAL BETA STRONTIUM (GFPC)**

Samples PE2-RSYE1-U8-S001 (160-29332-1) and PE2-RSYE1-U8-S011 (160-29332-11) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 07/06/2018, prepared on 07/09/2018 and analyzed on 07/27/2018.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix:  
 PE2-RSYE1-U8-S001 (160-29332-1) and PE2-RSYE1-U8-S011 (160-29332-11). The samples contained detritus material and rocks of varying sizes

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### **RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)**

Samples PE2-RSYE1-U8-S001 (160-29332-1), PE2-RSYE1-U8-S002 (160-29332-2), PE2-RSYE1-U8-S003 (160-29332-3), PE2-RSYE1-U8-S004 (160-29332-4), PE2-RSYE1-U8-S005 (160-29332-5), PE2-RSYE1-U8-S006 (160-29332-6), PE2-RSYE1-U8-S007 (160-29332-7), PE2-RSYE1-U8-S008 (160-29332-8), PE2-RSYE1-U8-S009 (160-29332-9), PE2-RSYE1-U8-S010 (160-29332-10), PE2-RSYE1-U8-S011 (160-29332-11), PE2-RSYE1-U8-S012 (160-29332-12), PE2-RSYE1-U8-S013 (160-29332-13), PE2-RSYE1-U8-S014 (160-29332-14), PE2-RSYE1-U8-S015 (160-29332-15), PE2-RSYE1-U8-S016 (160-29332-16), PE2-RSYE1-U8-S017 (160-29332-17) and PE2-RSYE1-U8-S018 (160-29332-18) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 07/06/2018, prepared on 07/11/2018 and analyzed on 08/01/2018.

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Co-60: PE2-RSYE1-U8-S010 (160-29332-10). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.  
 PE2-RSYE1-U8-S006 (160-29332-6), PE2-RSYE1-U8-S007 (160-29332-7) and PE2-RSYE1-U8-S014 (160-29332-14)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# CHAIN OF CUSTODY

Ref. Document # PE2-RSYE1 USE8 SH SAND#546  
 Page 2 of 2

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: <u>Nels Johnson</u>
(Name & phone #)
Send Report To: <u>Eddie Kalombo</u>
Phone/Fax Number: <u>415-987-0760</u>
Address: <u>4005 Port Chicago Hwy</u>
City: <u>Concord, CA, 94520</u>

Lab Contact Name / ph. #: <u>Rhonda Ridhouser (314) 298-8566</u>
Waybill Number: <u>7.3.18</u>
Lab Destination: <u>TestAmerica (St. Louis Lab) 13715 Rider Trail North Earth City, MO 65045</u>

Sample ID Number	Sample Description	Collection Information			Matrix	# of containers	Preservative (water)	N/A	N/A	N/A	Dose Rate μR/Hr	Analyses Requested
		Date	Time	Method			Container Type					
PE2-RSYE1-U8-S011	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	10:25	G	SO	1	16 oz. plastic jar	X	X	X	5	
PE2-RSYE1-U8-S012	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	10:29	G	SO	1	16 oz. plastic jar	X			5	
PE2-RSYE1-U8-S013	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	10:32	G	SO	1	16 oz. plastic jar	X			5	
PE2-RSYE1-U8-S014	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	10:36	G	SO	1	16 oz. plastic jar	X			5	
PE2-RSYE1-U8-S015	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	10:46	G	SO	1	16 oz. plastic jar	X			5	
PE2-RSYE1-U8-S016	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	10:49	G	SO	1	16 oz. plastic jar	X			5	
PE2-RSYE1-U8-S017	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	10:47	G	SO	1	16 oz. plastic jar	X			5	
PE2-RSYE1-U8-S018	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	10:50	G	SO	1	16 oz. plastic jar	X			5	



160-29332 Chain of Custody

## Special Instructions:

Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g.

7 days ingrown draft and follow with 21 days final.

Standard TAT -10-day	<input type="checkbox"/> 24-hr	<input type="checkbox"/> 3-day	<input type="checkbox"/> 10-day	I	II	III	Project Specific:	Level OQC Required:
<u>JOPAUZEN Ramona</u>	<u>7.1.18</u>	<u>1600</u>	<u>1100</u>	<u>Received By:</u>	<u>EDIE KAMANO</u>	<u>7.1.18</u>	<u>Received By:</u>	<u>Method Codes</u>
<u>EDIE KAMANO</u>	<u>7.1.18</u>	<u>1600</u>	<u>1100</u>	<u>Received By:</u>	<u>Nicholas Hess</u>	<u>7.1.18</u>	<u>Received By:</u>	<u>Matrix Codes</u>
<u>EDIE KAMANO</u>	<u>7.1.18</u>	<u>1600</u>	<u>1100</u>	<u>Received By:</u>	<u>Nicholas Hess</u>	<u>7.1.18</u>	<u>Received By:</u>	<u>DW = Drinking Water</u>
<u>EDIE KAMANO</u>	<u>7.1.18</u>	<u>1600</u>	<u>1100</u>	<u>Received By:</u>	<u>Nicholas Hess</u>	<u>7.1.18</u>	<u>Received By:</u>	<u>GW = Ground Water</u>
<u>EDIE KAMANO</u>	<u>7.1.18</u>	<u>1600</u>	<u>1100</u>	<u>Received By:</u>	<u>Nicholas Hess</u>	<u>7.1.18</u>	<u>Received By:</u>	<u>SL = Sludge</u>
<u>EDIE KAMANO</u>	<u>7.1.18</u>	<u>1600</u>	<u>1100</u>	<u>Received By:</u>	<u>Nicholas Hess</u>	<u>7.1.18</u>	<u>Received By:</u>	<u>CP = Chip Samples</u>
<u>EDIE KAMANO</u>	<u>7.1.18</u>	<u>1600</u>	<u>1100</u>	<u>Received By:</u>	<u>Nicholas Hess</u>	<u>7.1.18</u>	<u>Received By:</u>	<u>WW = Waste Water</u>
<u>EDIE KAMANO</u>	<u>7.1.18</u>	<u>1600</u>	<u>1100</u>	<u>Received By:</u>	<u>Nicholas Hess</u>	<u>7.1.18</u>	<u>Received By:</u>	<u>AB3=Asbestos, PO=Pipe Opening</u>



APTIM Federal Services, LLC  
Concord, CA 94520

## CHAIN OF CUSTODY

Ref. Document # PE2\_RSYE1\_USE8\_SH\_SAND#546  
Page 1 of 2

4005 Port Chicago Hwy  
Concord, CA 94520

Project Number: 500506

CTO-012 RSYE1 USE 8 Revetment Spoils  
Systematic

Project Name: HPNS - Parcel E-2  
Project Location: Purchase Order #: 202296

Shipper/Pickup Date: 7.2.18

Send Report To: Eddie Kalombo  
Phone/Fax Number: 415.987-0760  
Address: 4005 Port Chicago Hwy  
City: Concord, CA, 94520  
Sampler's Name(s): JO ADEZEN RUMTAGE

Lab Contact Name / ph. #: Rhonda Ridderhauer (314) 298-8566  
Lab Destination: TestAmerica (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63045

Waybill Number: 13715 Rider Trail North

Strontium 90 (EPA 905 MOD)  
Gamma Spec (EPA 191.1 M) -  
(7 day in-growth preliminary results and  
full 21 day in growth for full gamma  
results)

Total Strontium (EPA 905 MOD)  
Strontium 90 (EPA 905 MOD)

Dose Rate  
μR/H

Sample ID Number	Sample Description	Date	Time	Method	Matrix	# of containers	Analyses Requested		
							Preservative (water)	Container Type	N/A
PE2-RSYE1-U8-S001	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	0945	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYE1-U8-S002	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	0945	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYE1-U8-S003	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	0953	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYE1-U8-S004	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	0957	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYE1-U8-S005	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	1001	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYE1-U8-S006	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	1005	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYE1-U8-S007	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	1009	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYE1-U8-S008	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	1013	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYE1-U8-S009	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	1017	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYE1-U8-S010	Parcel E-2 RSYE1 USE 8 Systematic	6/29/18	1021	G	SO	1	16 oz. plastic jar	X	X

### Special Instructions:

7 days ingrown draft and follow with 21 days final.

Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g.

Standard TAT - 10-day		<input type="checkbox"/> 24-hr	<input type="checkbox"/> 3-day	<input type="checkbox"/> 10-day	I	II	III	Project Specific:	
Relinquished By: <b>J. ADEZEN</b>	Received By: <b>R. KALOMBO</b>	Date: 6/29/2018	Received By: <b>R. KALOMBO</b>	Date: 6/29/2018	Time: 1100	Time: 1100	Date: 6/29/2018	Method Codes	C = Composite
Relinquished By: <b>R. KALOMBO</b>	Received By: <b>R. KALOMBO</b>	Date: 7.2.18	Received By: <b>R. KALOMBO</b>	Date: 7.2.18	Time: 1600	Time: 1600	Date: 7.2.18	Matrix Codes	G = Grab
Relinquished By: <b>R. KALOMBO</b>	Received By: <b>R. KALOMBO</b>	Date:	Received By: <b>R. KALOMBO</b>	Date:	Time:	Time:	Date:	DW = Drinking Water	SO = Soil
Relinquished By: <b>R. KALOMBO</b>	Received By: <b>R. KALOMBO</b>	Date:	Received By: <b>R. KALOMBO</b>	Date:	Time:	Time:	Date:	GW = Ground Water	SL = Sludge
Relinquished By: <b>R. KALOMBO</b>	Received By: <b>R. KALOMBO</b>	Date:	Received By: <b>R. KALOMBO</b>	Date:	Time:	Time:	Date:	WW = Waste Water	CP = Chip Samples
Relinquished By: <b>R. KALOMBO</b>	Received By: <b>R. KALOMBO</b>	Date:	Received By: <b>R. KALOMBO</b>	Date:	Time:	Time:	Date:	A = Air	ABS=Asbestos, PO=Pipe Opening

## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-29332-2

**Login Number: 29332****List Number: 1****Creator: Press, Nicholas B****List Source: TestAmerica St. Louis**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

## Definitions/Glossary

Client: Aptim Federal Services LLC  
 Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

### **Qualifiers**

#### **Rad**

<b>Qualifier</b>	<b>Qualifier Description</b>
U	Undetected at the Limit of Detection.

### **Glossary**

#### **Abbreviation** **These commonly used abbreviations may or may not be present in this report.**

□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

## Method Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

<b>Method</b>	<b>Method Description</b>	<b>Protocol</b>	<b>Laboratory</b>
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

**Protocol References:**

DOE = U.S. Department of Energy

None = None

**Laboratory References:**

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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## Sample Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-29332-1	PE2-RSYE1-U8-S001	Solid	06/29/18 09:45	07/05/18 08:40
160-29332-2	PE2-RSYE1-U8-S002	Solid	06/29/18 09:49	07/05/18 08:40
160-29332-3	PE2-RSYE1-U8-S003	Solid	06/29/18 09:53	07/05/18 08:40
160-29332-4	PE2-RSYE1-U8-S004	Solid	06/29/18 09:57	07/05/18 08:40
160-29332-5	PE2-RSYE1-U8-S005	Solid	06/29/18 10:01	07/05/18 08:40
160-29332-6	PE2-RSYE1-U8-S006	Solid	06/29/18 10:05	07/05/18 08:40
160-29332-7	PE2-RSYE1-U8-S007	Solid	06/29/18 10:09	07/05/18 08:40
160-29332-8	PE2-RSYE1-U8-S008	Solid	06/29/18 10:13	07/05/18 08:40
160-29332-9	PE2-RSYE1-U8-S009	Solid	06/29/18 10:17	07/05/18 08:40
160-29332-10	PE2-RSYE1-U8-S010	Solid	06/29/18 10:21	07/05/18 08:40
160-29332-11	PE2-RSYE1-U8-S011	Solid	06/29/18 10:25	07/05/18 08:40
160-29332-12	PE2-RSYE1-U8-S012	Solid	06/29/18 10:29	07/05/18 08:40
160-29332-13	PE2-RSYE1-U8-S013	Solid	06/29/18 10:32	07/05/18 08:40
160-29332-14	PE2-RSYE1-U8-S014	Solid	06/29/18 10:36	07/05/18 08:40
160-29332-15	PE2-RSYE1-U8-S015	Solid	06/29/18 10:40	07/05/18 08:40
160-29332-16	PE2-RSYE1-U8-S016	Solid	06/29/18 10:43	07/05/18 08:40
160-29332-17	PE2-RSYE1-U8-S017	Solid	06/29/18 10:47	07/05/18 08:40
160-29332-18	PE2-RSYE1-U8-S018	Solid	06/29/18 10:50	07/05/18 08:40

# Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

**Client Sample ID: PE2-RSYE1-U8-S001****Lab Sample ID: 160-29332-1**

Matrix: Solid

Date Collected: 06/29/18 09:45

Date Received: 07/05/18 08:40

**Method: 905.0 - Total Beta Strontium (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.0137	U	0.0514	0.0514	0.331	0.0436	pCi/g	07/09/18 09:31	07/27/18 11:27	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	91.4		40 - 110					07/09/18 09:31	07/27/18 11:27	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
<b>Actinium 228</b>	<b>0.497</b>		0.187	0.194		0.0818	pCi/g	07/11/18 03:27	08/01/18 19:10	1
Actinium-227	0.106	U	0.211	0.212		0.734	pCi/g	07/11/18 03:27	08/01/18 19:10	1
Bismuth-212	0.229	U	0.741	0.741		0.582	pCi/g	07/11/18 03:27	08/01/18 19:10	1
<b>Bismuth-214</b>	<b>0.486</b>		0.126	0.136		0.0315	pCi/g	07/11/18 03:27	08/01/18 19:10	1
Cesium-137	-0.0481	U	0.121	0.121	0.0700	0.0618	pCi/g	07/11/18 03:27	08/01/18 19:10	1
Cobalt-60	0.0302	U	0.0228	0.0230	0.200	0.0431	pCi/g	07/11/18 03:27	08/01/18 19:10	1
<b>Lead-210</b>	<b>1.35</b>		1.58	1.59		1.23	pCi/g	07/11/18 03:27	08/01/18 19:10	1
<b>Lead-212</b>	<b>0.438</b>		0.104	0.118		0.0538	pCi/g	07/11/18 03:27	08/01/18 19:10	1
<b>Lead-214</b>	<b>0.563</b>		0.135	0.147		0.0440	pCi/g	07/11/18 03:27	08/01/18 19:10	1
<b>Potassium-40</b>	<b>11.4</b>		1.78	2.13		0.284	pCi/g	07/11/18 03:27	08/01/18 19:10	1
Protactinium-231	0.490	U	2.10	2.10		2.48	pCi/g	07/11/18 03:27	08/01/18 19:10	1
<b>Radium-226</b>	<b>0.486</b>		0.126	0.136	0.700	0.0315	pCi/g	07/11/18 03:27	08/01/18 19:10	1
<b>Radium-228</b>	<b>0.497</b>		0.187	0.194		0.0818	pCi/g	07/11/18 03:27	08/01/18 19:10	1
<b>Thallium-208</b>	<b>0.108</b>		0.106	0.107		0.0407	pCi/g	07/11/18 03:27	08/01/18 19:10	1
<b>Thorium-228</b>	<b>0.438</b>		0.104	0.118		0.0538	pCi/g	07/11/18 03:27	08/01/18 19:10	1
<b>Thorium-232</b>	<b>0.497</b>		0.187	0.194		0.0818	pCi/g	07/11/18 03:27	08/01/18 19:10	1
Thorium-234	-0.418	U	1.49	1.49		1.24	pCi/g	07/11/18 03:27	08/01/18 19:10	1
Uranium-235	-0.0105	U	0.0561	0.0561		0.423	pCi/g	07/11/18 03:27	08/01/18 19:10	1
Uranium-238	-0.418	U	1.49	1.49		1.24	pCi/g	07/11/18 03:27	08/01/18 19:10	1

**Client Sample ID: PE2-RSYE1-U8-S002****Lab Sample ID: 160-29332-2**

Matrix: Solid

Date Collected: 06/29/18 09:49

Date Received: 07/05/18 08:40

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
<b>Actinium 228</b>	<b>0.432</b>		0.210	0.215		0.0791	pCi/g	07/11/18 03:27	08/01/18 19:09	1
Actinium-227	-0.308	U	0.747	0.748		0.478	pCi/g	07/11/18 03:27	08/01/18 19:09	1
Bismuth-212	0.240	U	0.743	0.744		0.589	pCi/g	07/11/18 03:27	08/01/18 19:09	1
<b>Bismuth-214</b>	<b>0.594</b>		0.121	0.136		0.0142	pCi/g	07/11/18 03:27	08/01/18 19:09	1
Cesium-137	0.00237	U	0.0529	0.0529	0.0700	0.0433	pCi/g	07/11/18 03:27	08/01/18 19:09	1
Cobalt-60	0.0121	U	0.0299	0.0299	0.200	0.0321	pCi/g	07/11/18 03:27	08/01/18 19:09	1
Lead-210	0.0619	U	1.27	1.27		1.04	pCi/g	07/11/18 03:27	08/01/18 19:09	1
<b>Lead-212</b>	<b>0.272</b>		0.0860	0.0929		0.0534	pCi/g	07/11/18 03:27	08/01/18 19:09	1
<b>Lead-214</b>	<b>0.392</b>		0.108	0.115		0.0437	pCi/g	07/11/18 03:27	08/01/18 19:09	1
<b>Potassium-40</b>	<b>11.1</b>		1.64	1.99		0.256	pCi/g	07/11/18 03:27	08/01/18 19:09	1
Protactinium-231	-0.768	U	2.66	2.66		2.17	pCi/g	07/11/18 03:27	08/01/18 19:09	1

# Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

**Client Sample ID: PE2-RSYE1-U8-S002**

Date Collected: 06/29/18 09:49

Date Received: 07/05/18 08:40

**Lab Sample ID: 160-29332-2**

Matrix: Solid

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Radium-226	0.594		0.121	0.136	0.700	0.0142	pCi/g	07/11/18 03:27	08/01/18 19:09	1
Radium-228	0.432		0.210	0.215		0.0791	pCi/g	07/11/18 03:27	08/01/18 19:09	1
Thallium-208	0.174		0.0628	0.0653		0.0222	pCi/g	07/11/18 03:27	08/01/18 19:09	1
Thorium-228	0.272		0.0860	0.0929		0.0534	pCi/g	07/11/18 03:27	08/01/18 19:09	1
<b>Thorium-232</b>	<b>0.432</b>		0.210	0.215		0.0791	pCi/g	07/11/18 03:27	08/01/18 19:09	1
Thorium-234	0.286	U	1.06	1.06		0.689	pCi/g	07/11/18 03:27	08/01/18 19:09	1
Uranium-235	0.0655	U	0.162	0.162		0.239	pCi/g	07/11/18 03:27	08/01/18 19:09	1
Uranium-238	0.286	U	1.06	1.06		0.689	pCi/g	07/11/18 03:27	08/01/18 19:09	1

**Client Sample ID: PE2-RSYE1-U8-S003**

Date Collected: 06/29/18 09:53

Date Received: 07/05/18 08:40

**Lab Sample ID: 160-29332-3**

Matrix: Solid

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.473</b>		0.270	0.274		0.106	pCi/g	07/11/18 03:27	08/01/18 19:07	1
Actinium-227	-0.422	U	0.463	0.465		0.621	pCi/g	07/11/18 03:27	08/01/18 19:07	1
Bismuth-212	-0.826	U	1.54	1.54		1.21	pCi/g	07/11/18 03:27	08/01/18 19:07	1
<b>Bismuth-214</b>	<b>0.449</b>		0.134	0.142		0.0406	pCi/g	07/11/18 03:27	08/01/18 19:07	1
Cesium-137	-0.00163	U	0.0558	0.0558	0.0700	0.0455	pCi/g	07/11/18 03:27	08/01/18 19:07	1
Cobalt-60	0.0193	U	0.0878	0.0878	0.200	0.0437	pCi/g	07/11/18 03:27	08/01/18 19:07	1
Lead-210	0.490	U	0.977	0.979		0.704	pCi/g	07/11/18 03:27	08/01/18 19:07	1
<b>Lead-212</b>	<b>0.525</b>		0.107	0.127		0.0389	pCi/g	07/11/18 03:27	08/01/18 19:07	1
<b>Lead-214</b>	<b>0.506</b>		0.124	0.135		0.0731	pCi/g	07/11/18 03:27	08/01/18 19:07	1
<b>Potassium-40</b>	<b>11.7</b>		1.99	2.32		0.350	pCi/g	07/11/18 03:27	08/01/18 19:07	1
Protactinium-231	0.693	U	2.15	2.15		2.36	pCi/g	07/11/18 03:27	08/01/18 19:07	1
<b>Radium-226</b>	<b>0.449</b>		0.134	0.142	0.700	0.0406	pCi/g	07/11/18 03:27	08/01/18 19:07	1
Radium-228	0.473		0.270	0.274		0.106	pCi/g	07/11/18 03:27	08/01/18 19:07	1
Thallium-208	0.204		0.0627	0.0662		0.0109	pCi/g	07/11/18 03:27	08/01/18 19:07	1
Thorium-228	0.525		0.107	0.127		0.0389	pCi/g	07/11/18 03:27	08/01/18 19:07	1
<b>Thorium-232</b>	<b>0.473</b>		0.270	0.274		0.106	pCi/g	07/11/18 03:27	08/01/18 19:07	1
<b>Thorium-234</b>	<b>1.35</b>		1.09	1.10		0.720	pCi/g	07/11/18 03:27	08/01/18 19:07	1
Uranium-235	-0.143	U	0.348	0.348		0.347	pCi/g	07/11/18 03:27	08/01/18 19:07	1
<b>Uranium-238</b>	<b>1.35</b>		1.09	1.10		0.720	pCi/g	07/11/18 03:27	08/01/18 19:07	1

**Client Sample ID: PE2-RSYE1-U8-S004**

Date Collected: 06/29/18 09:57

Date Received: 07/05/18 08:40

**Lab Sample ID: 160-29332-4**

Matrix: Solid

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.761</b>		0.268	0.279		0.0777	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Actinium-227	-0.407	U	1.06	1.06		0.857	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Bismuth-212	0.479	U	1.27	1.27		1.02	pCi/g	07/11/18 03:27	08/01/18 19:52	1

# Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

**Client Sample ID: PE2-RSYE1-U8-S004**

Date Collected: 06/29/18 09:57

Date Received: 07/05/18 08:40

**Lab Sample ID: 160-29332-4**

Matrix: Solid

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.458		0.157	0.164		0.0670	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Cesium-137	-0.0161	U	0.0789	0.0789	0.0700	0.0636	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Cobalt-60	0.0517		0.0344	0.0348	0.200	0.0134	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Lead-210	0.769	U	1.60	1.60		1.12	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Lead-212	0.494		0.108	0.120		0.0535	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Lead-214	0.453		0.131	0.139		0.0739	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Potassium-40	13.0		1.73	2.17		0.135	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Protactinium-231	0.000	U	0.374	0.374		2.57	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Radium-226	0.458		0.157	0.164	0.700	0.0670	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Radium-228	0.761		0.268	0.279		0.0777	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Thallium-208	0.207		0.0651	0.0684		0.0176	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Thorium-228	0.494		0.108	0.120		0.0535	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Thorium-232	0.761		0.268	0.279		0.0777	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Thorium-234	-0.899	U	1.21	1.22		1.42	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Uranium-235	0.00800	U	0.0416	0.0416		0.470	pCi/g	07/11/18 03:27	08/01/18 19:52	1
Uranium-238	-0.899	U	1.21	1.22		1.42	pCi/g	07/11/18 03:27	08/01/18 19:52	1

**Client Sample ID: PE2-RSYE1-U8-S005**

Date Collected: 06/29/18 10:01

Date Received: 07/05/18 08:40

**Lab Sample ID: 160-29332-5**

Matrix: Solid

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.638		0.236	0.245		0.0690	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Actinium-227	-0.324	U	0.692	0.693		0.513	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Bismuth-212	0.217	U	0.745	0.746		0.590	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Bismuth-214	0.0374	U	0.134	0.134		0.124	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Cesium-137	-0.0238	U	0.0841	0.0842	0.0700	0.0674	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Cobalt-60	0.0166	U	0.0739	0.0739	0.200	0.0460	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Lead-210	1.09		1.46	1.47		0.988	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Lead-212	0.434		0.101	0.116		0.0530	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Lead-214	0.537		0.141	0.152		0.0623	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Potassium-40	14.4		1.90	2.41		0.267	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Protactinium-231	0.000	U	0.878	0.878		2.22	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Radium-226	0.0374	U	0.134	0.134	0.700	0.124	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Radium-228	0.638		0.236	0.245		0.0690	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Thallium-208	0.171		0.0621	0.0646		0.0219	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Thorium-228	0.434		0.101	0.116		0.0530	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Thorium-232	0.638		0.236	0.245		0.0690	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Thorium-234	0.681	U	0.622	0.626		0.812	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Uranium-235	-0.0151	U	0.311	0.311		0.324	pCi/g	07/11/18 03:27	08/01/18 19:46	1
Uranium-238	0.681	U	0.622	0.626		0.812	pCi/g	07/11/18 03:27	08/01/18 19:46	1

# Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

**Client Sample ID: PE2-RSYE1-U8-S006**

Date Collected: 06/29/18 10:05

Date Received: 07/05/18 08:40

**Lab Sample ID: 160-29332-6**

Matrix: Solid

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.354</b>		0.301	0.303		0.161	pCi/g	07/11/18 03:27	08/01/18 19:47	1
Actinium-227	-0.469	U	1.11	1.11		0.895	pCi/g	07/11/18 03:27	08/01/18 19:47	1
Bismuth-212	0.598	U	1.13	1.13		0.876	pCi/g	07/11/18 03:27	08/01/18 19:47	1
<b>Bismuth-214</b>	<b>0.590</b>		0.168	0.179		0.0595	pCi/g	07/11/18 03:27	08/01/18 19:47	1
Cesium-137	-0.0749	U	0.125	0.125	0.0700	0.0983	pCi/g	07/11/18 03:27	08/01/18 19:47	1
<b>Cobalt-60</b>	<b>0.0420</b>		0.0349	0.0351	0.200	0.0168	pCi/g	07/11/18 03:27	08/01/18 19:47	1
<b>Lead-210</b>	<b>1.99</b>		1.44	1.46		0.890	pCi/g	07/11/18 03:27	08/01/18 19:47	1
<b>Lead-212</b>	<b>0.545</b>		0.117	0.137		0.0570	pCi/g	07/11/18 03:27	08/01/18 19:47	1
<b>Lead-214</b>	<b>0.708</b>		0.152	0.169		0.0575	pCi/g	07/11/18 03:27	08/01/18 19:47	1
<b>Potassium-40</b>	<b>12.7</b>		1.96	2.35		0.271	pCi/g	07/11/18 03:27	08/01/18 19:47	1
Protactinium-231	0.000	U	0.746	0.746		2.80	pCi/g	07/11/18 03:27	08/01/18 19:47	1
<b>Radium-226</b>	<b>0.590</b>		0.168	0.179	0.700	0.0595	pCi/g	07/11/18 03:27	08/01/18 19:47	1
<b>Radium-228</b>	<b>0.354</b>		0.301	0.303		0.161	pCi/g	07/11/18 03:27	08/01/18 19:47	1
<b>Thallium-208</b>	<b>0.219</b>		0.0606	0.0647		0.00979	pCi/g	07/11/18 03:27	08/01/18 19:47	1
<b>Thorium-228</b>	<b>0.545</b>		0.117	0.137		0.0570	pCi/g	07/11/18 03:27	08/01/18 19:47	1
<b>Thorium-232</b>	<b>0.354</b>		0.301	0.303		0.161	pCi/g	07/11/18 03:27	08/01/18 19:47	1
Thorium-234	0.605	U	0.601	0.604		0.875	pCi/g	07/11/18 03:27	08/01/18 19:47	1
Uranium-235	-0.211	U	0.319	0.319		0.518	pCi/g	07/11/18 03:27	08/01/18 19:47	1
Uranium-238	0.605	U	0.601	0.604		0.875	pCi/g	07/11/18 03:27	08/01/18 19:47	1

**Client Sample ID: PE2-RSYE1-U8-S007**

Date Collected: 06/29/18 10:09

Date Received: 07/05/18 08:40

**Lab Sample ID: 160-29332-7**

Matrix: Solid

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.622</b>		0.233	0.241		0.128	pCi/g	07/11/18 03:27	08/01/18 19:49	1
Actinium-227	-0.480	U	1.20	1.20		0.973	pCi/g	07/11/18 03:27	08/01/18 19:49	1
<b>Bismuth-212</b>	<b>1.69</b>		0.618	0.641		0.131	pCi/g	07/11/18 03:27	08/01/18 19:49	1
<b>Bismuth-214</b>	<b>0.612</b>		0.189	0.199		0.0752	pCi/g	07/11/18 03:27	08/01/18 19:49	1
Cesium-137	-0.0326	U	0.104	0.104	0.0700	0.0833	pCi/g	07/11/18 03:27	08/01/18 19:49	1
Cobalt-60	0.00416	U	0.0761	0.0761	0.200	0.0372	pCi/g	07/11/18 03:27	08/01/18 19:49	1
<b>Lead-210</b>	<b>2.61</b>		1.97	2.00		1.25	pCi/g	07/11/18 03:27	08/01/18 19:49	1
<b>Lead-212</b>	<b>0.502</b>		0.114	0.125		0.0548	pCi/g	07/11/18 03:27	08/01/18 19:49	1
<b>Lead-214</b>	<b>0.516</b>		0.134	0.144		0.0452	pCi/g	07/11/18 03:27	08/01/18 19:49	1
<b>Potassium-40</b>	<b>12.7</b>		1.94	2.33		0.449	pCi/g	07/11/18 03:27	08/01/18 19:49	1
Protactinium-231	0.680	U	2.65	2.65		2.83	pCi/g	07/11/18 03:27	08/01/18 19:49	1
<b>Radium-226</b>	<b>0.612</b>		0.189	0.199	0.700	0.0752	pCi/g	07/11/18 03:27	08/01/18 19:49	1
<b>Radium-228</b>	<b>0.622</b>		0.233	0.241		0.128	pCi/g	07/11/18 03:27	08/01/18 19:49	1
<b>Thallium-208</b>	<b>0.226</b>		0.0622	0.0663		0.00995	pCi/g	07/11/18 03:27	08/01/18 19:49	1
<b>Thorium-228</b>	<b>0.502</b>		0.114	0.125		0.0548	pCi/g	07/11/18 03:27	08/01/18 19:49	1
<b>Thorium-232</b>	<b>0.622</b>		0.233	0.241		0.128	pCi/g	07/11/18 03:27	08/01/18 19:49	1
Thorium-234	-1.35	U	1.47	1.48		1.70	pCi/g	07/11/18 03:27	08/01/18 19:49	1
Uranium-235	-0.117	U	0.381	0.381		0.552	pCi/g	07/11/18 03:27	08/01/18 19:49	1
Uranium-238	-1.35	U	1.47	1.48		1.70	pCi/g	07/11/18 03:27	08/01/18 19:49	1

# Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

**Client Sample ID: PE2-RSYE1-U8-S008**

Date Collected: 06/29/18 10:13

Date Received: 07/05/18 08:40

**Lab Sample ID: 160-29332-8**

Matrix: Solid

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.614</b>		0.157	0.169		0.0506	pCi/g	07/11/18 03:27	08/01/18 19:48	1
Actinium-227	-0.347	U	0.784	0.785		0.528	pCi/g	07/11/18 03:27	08/01/18 19:48	1
Bismuth-212	0.208	U	0.657	0.657		0.518	pCi/g	07/11/18 03:27	08/01/18 19:48	1
<b>Bismuth-214</b>	<b>0.388</b>		0.123	0.130		0.0467	pCi/g	07/11/18 03:27	08/01/18 19:48	1
Cesium-137	0.0182	U	0.0554	0.0555	0.0700	0.0436	pCi/g	07/11/18 03:27	08/01/18 19:48	1
Cobalt-60	-0.0360	U	0.0974	0.0975	0.200	0.0479	pCi/g	07/11/18 03:27	08/01/18 19:48	1
<b>Lead-210</b>	<b>2.19</b>		1.66	1.68		1.01	pCi/g	07/11/18 03:27	08/01/18 19:48	1
<b>Lead-212</b>	<b>0.390</b>		0.0905	0.104		0.0441	pCi/g	07/11/18 03:27	08/01/18 19:48	1
<b>Lead-214</b>	<b>0.493</b>		0.116	0.127		0.0607	pCi/g	07/11/18 03:27	08/01/18 19:48	1
<b>Potassium-40</b>	<b>11.7</b>		1.74	2.11		0.448	pCi/g	07/11/18 03:27	08/01/18 19:48	1
Protactinium-231	0.000	U	0.561	0.561		2.16	pCi/g	07/11/18 03:27	08/01/18 19:48	1
<b>Radium-226</b>	<b>0.388</b>		0.123	0.130	0.700	0.0467	pCi/g	07/11/18 03:27	08/01/18 19:48	1
<b>Radium-228</b>	<b>0.614</b>		0.157	0.169		0.0506	pCi/g	07/11/18 03:27	08/01/18 19:48	1
<b>Thallium-208</b>	<b>0.173</b>		0.0913	0.0930		0.0385	pCi/g	07/11/18 03:27	08/01/18 19:48	1
<b>Thorium-228</b>	<b>0.390</b>		0.0905	0.104		0.0441	pCi/g	07/11/18 03:27	08/01/18 19:48	1
<b>Thorium-232</b>	<b>0.614</b>		0.157	0.169		0.0506	pCi/g	07/11/18 03:27	08/01/18 19:48	1
Thorium-234	0.465	U	0.959	0.960		0.753	pCi/g	07/11/18 03:27	08/01/18 19:48	1
Uranium-235	0.0862	U	0.292	0.292		0.210	pCi/g	07/11/18 03:27	08/01/18 19:48	1
Uranium-238	0.465	U	0.959	0.960		0.753	pCi/g	07/11/18 03:27	08/01/18 19:48	1

**Client Sample ID: PE2-RSYE1-U8-S009**

Date Collected: 06/29/18 10:17

Date Received: 07/05/18 08:40

**Lab Sample ID: 160-29332-9**

Matrix: Solid

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.525</b>		0.191	0.199		0.0767	pCi/g	07/11/18 03:27	08/01/18 19:54	1
Actinium-227	0.202	U	0.720	0.720		0.584	pCi/g	07/11/18 03:27	08/01/18 19:54	1
Bismuth-212	0.392	U	0.709	0.710		0.544	pCi/g	07/11/18 03:27	08/01/18 19:54	1
<b>Bismuth-214</b>	<b>0.533</b>		0.114	0.127		0.0140	pCi/g	07/11/18 03:27	08/01/18 19:54	1
Cesium-137	0.0177	U	0.0472	0.0472	0.0700	0.0367	pCi/g	07/11/18 03:27	08/01/18 19:54	1
Cobalt-60	-0.0234	U	0.120	0.120	0.200	0.0541	pCi/g	07/11/18 03:27	08/01/18 19:54	1
Lead-210	-0.277	U	1.46	1.46		1.21	pCi/g	07/11/18 03:27	08/01/18 19:54	1
<b>Lead-212</b>	<b>0.351</b>		0.0935	0.104		0.0564	pCi/g	07/11/18 03:27	08/01/18 19:54	1
<b>Lead-214</b>	<b>0.500</b>		0.0968	0.110		0.0482	pCi/g	07/11/18 03:27	08/01/18 19:54	1
<b>Potassium-40</b>	<b>10.5</b>		1.58	1.91		0.252	pCi/g	07/11/18 03:27	08/01/18 19:54	1
Protactinium-231	-0.783	U	2.72	2.72		2.22	pCi/g	07/11/18 03:27	08/01/18 19:54	1
<b>Radium-226</b>	<b>0.533</b>		0.114	0.127	0.700	0.0140	pCi/g	07/11/18 03:27	08/01/18 19:54	1
<b>Radium-228</b>	<b>0.525</b>		0.191	0.199		0.0767	pCi/g	07/11/18 03:27	08/01/18 19:54	1
<b>Thallium-208</b>	<b>0.194</b>		0.0642	0.0673		0.0214	pCi/g	07/11/18 03:27	08/01/18 19:54	1
<b>Thorium-228</b>	<b>0.351</b>		0.0935	0.104		0.0564	pCi/g	07/11/18 03:27	08/01/18 19:54	1
<b>Thorium-232</b>	<b>0.525</b>		0.191	0.199		0.0767	pCi/g	07/11/18 03:27	08/01/18 19:54	1
Thorium-234	-0.0715	U	1.11	1.11		0.915	pCi/g	07/11/18 03:27	08/01/18 19:54	1
Uranium-235	0.144	U	0.294	0.295		0.286	pCi/g	07/11/18 03:27	08/01/18 19:54	1
Uranium-238	-0.0715	U	1.11	1.11		0.915	pCi/g	07/11/18 03:27	08/01/18 19:54	1

# Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

**Client Sample ID: PE2-RSYE1-U8-S010****Lab Sample ID: 160-29332-10**

Date Collected: 06/29/18 10:21

Matrix: Solid

Date Received: 07/05/18 08:40

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.518</b>		0.234	0.240		0.0806	pCi/g	07/11/18 03:27	08/01/18 19:53	1
Actinium-227	-0.237	U	0.937	0.938		0.762	pCi/g	07/11/18 03:27	08/01/18 19:53	1
Bismuth-212	0.0622	U	0.911	0.911		0.744	pCi/g	07/11/18 03:27	08/01/18 19:53	1
<b>Bismuth-214</b>	<b>0.401</b>		0.140	0.146		0.0603	pCi/g	07/11/18 03:27	08/01/18 19:53	1
Cesium-137	-0.0453	U	0.149	0.149	0.0700	0.0590	pCi/g	07/11/18 03:27	08/01/18 19:53	1
Cobalt-60	-0.0903	U	0.0519	0.0527	0.200	0.0735	pCi/g	07/11/18 03:27	08/01/18 19:53	1
Lead-210	-0.331	U	1.35	1.35		1.68	pCi/g	07/11/18 03:27	08/01/18 19:53	1
<b>Lead-212</b>	<b>0.500</b>		0.106	0.124		0.0516	pCi/g	07/11/18 03:27	08/01/18 19:53	1
<b>Lead-214</b>	<b>0.425</b>		0.116	0.124		0.0490	pCi/g	07/11/18 03:27	08/01/18 19:53	1
<b>Potassium-40</b>	<b>11.0</b>		1.73	2.06		0.280	pCi/g	07/11/18 03:27	08/01/18 19:53	1
Protactinium-231	-1.03	U	3.22	3.22		2.61	pCi/g	07/11/18 03:27	08/01/18 19:53	1
<b>Radium-226</b>	<b>0.401</b>		0.140	0.146	0.700	0.0603	pCi/g	07/11/18 03:27	08/01/18 19:53	1
<b>Radium-228</b>	<b>0.518</b>		0.234	0.240		0.0806	pCi/g	07/11/18 03:27	08/01/18 19:53	1
<b>Thallium-208</b>	<b>0.221</b>		0.0699	0.0736		0.0260	pCi/g	07/11/18 03:27	08/01/18 19:53	1
<b>Thorium-228</b>	<b>0.500</b>		0.106	0.124		0.0516	pCi/g	07/11/18 03:27	08/01/18 19:53	1
<b>Thorium-232</b>	<b>0.518</b>		0.234	0.240		0.0806	pCi/g	07/11/18 03:27	08/01/18 19:53	1
<b>Thorium-234</b>	<b>2.03</b>		1.32	1.34		0.779	pCi/g	07/11/18 03:27	08/01/18 19:53	1
Uranium-235	-0.275	U	0.313	0.314		0.468	pCi/g	07/11/18 03:27	08/01/18 19:53	1
<b>Uranium-238</b>	<b>2.03</b>		1.32	1.34		0.779	pCi/g	07/11/18 03:27	08/01/18 19:53	1

**Client Sample ID: PE2-RSYE1-U8-S011****Lab Sample ID: 160-29332-11**

Date Collected: 06/29/18 10:25

Matrix: Solid

Date Received: 07/05/18 08:40

**Method: 905.0 - Total Beta Strontium (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.000571	U	0.0546	0.0546	0.331	0.0449	pCi/g	07/09/18 09:31	07/27/18 11:27	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>							
Sr Carrier	97.8		40 - 110							
					<b>Prepared</b>		<b>Analyzed</b>		<b>Dil Fac</b>	
					07/09/18 09:31		07/27/18 11:27		1	

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.326</b>		0.296	0.298		0.140	pCi/g	07/11/18 03:27	08/01/18 19:55	1
Actinium-227	0.247	U	0.571	0.572		0.379	pCi/g	07/11/18 03:27	08/01/18 19:55	1
Bismuth-212	-0.710	U	1.25	1.25		0.970	pCi/g	07/11/18 03:27	08/01/18 19:55	1
<b>Bismuth-214</b>	<b>0.270</b>		0.150	0.153		0.205	pCi/g	07/11/18 03:27	08/01/18 19:55	1
Cesium-137	0.0212	U	0.0872	0.0872	0.0700	0.0694	pCi/g	07/11/18 03:27	08/01/18 19:55	1
Cobalt-60	-0.106	U	0.0900	0.0906	0.200	0.0919	pCi/g	07/11/18 03:27	08/01/18 19:55	1
<b>Lead-210</b>	<b>1.85</b>		1.39	1.41		0.828	pCi/g	07/11/18 03:27	08/01/18 19:55	1
<b>Lead-212</b>	<b>0.372</b>		0.104	0.115		0.0558	pCi/g	07/11/18 03:27	08/01/18 19:55	1
<b>Lead-214</b>	<b>0.541</b>		0.136	0.147		0.0419	pCi/g	07/11/18 03:27	08/01/18 19:55	1
<b>Potassium-40</b>	<b>10.7</b>		1.87	2.17		0.335	pCi/g	07/11/18 03:27	08/01/18 19:55	1
Protactinium-231	0.242	U	3.08	3.08		2.52	pCi/g	07/11/18 03:27	08/01/18 19:55	1

# Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

**Client Sample ID: PE2-RSYE1-U8-S011****Lab Sample ID: 160-29332-11**

Date Collected: 06/29/18 10:25

Matrix: Solid

Date Received: 07/05/18 08:40

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Radium-226	0.270		0.150	0.153	0.700	0.205	pCi/g	07/11/18 03:27	08/01/18 19:55	1
Radium-228	0.326		0.296	0.298		0.140	pCi/g	07/11/18 03:27	08/01/18 19:55	1
Thallium-208	0.187		0.0659	0.0687		0.0191	pCi/g	07/11/18 03:27	08/01/18 19:55	1
Thorium-228	0.372		0.104	0.115		0.0558	pCi/g	07/11/18 03:27	08/01/18 19:55	1
<b>Thorium-232</b>	<b>0.326</b>		0.296	0.298		0.140	pCi/g	07/11/18 03:27	08/01/18 19:55	1
Thorium-234	-0.686	U		1.36	1.36	1.32	pCi/g	07/11/18 03:27	08/01/18 19:55	1
Uranium-235	-0.0194	U		0.435	0.435	0.348	pCi/g	07/11/18 03:27	08/01/18 19:55	1
Uranium-238	-0.686	U		1.36	1.36	1.32	pCi/g	07/11/18 03:27	08/01/18 19:55	1

**Client Sample ID: PE2-RSYE1-U8-S012****Lab Sample ID: 160-29332-12**

Date Collected: 06/29/18 10:29

Matrix: Solid

Date Received: 07/05/18 08:40

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.391</b>		0.309	0.312		0.142	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Actinium-227	0.124	U	0.271	0.272		0.430	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Bismuth-212	0.000	U	0.926	0.926		0.977	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Bismuth-214</b>	<b>0.472</b>		0.143	0.151		0.0497	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Cesium-137	-0.00159	U	0.0589	0.0589	0.0700	0.0481	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Cobalt-60	0.0422	U	0.0899	0.0900	0.200	0.0427	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Lead-210	-0.563	U		1.65	1.65	1.20	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Lead-212</b>	<b>0.427</b>		0.101	0.115		0.0444	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Lead-214</b>	<b>0.483</b>		0.136	0.145		0.0601	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Potassium-40</b>	<b>8.85</b>			1.72	1.94	0.342	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Protactinium-231	0.847	U		2.64	2.65	2.14	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Radium-226</b>	<b>0.472</b>		0.143	0.151	0.700	0.0497	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Radium-228	0.391		0.309	0.312		0.142	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Thallium-208	0.273		0.0715	0.0769		0.0107	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Thorium-228	0.427		0.101	0.115		0.0444	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Thorium-232</b>	<b>0.391</b>		0.309	0.312		0.142	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Thorium-234</b>	<b>1.99</b>			1.05	1.07	0.595	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Uranium-235	0.108	U	0.298	0.298		0.259	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Uranium-238</b>	<b>1.99</b>			1.05	1.07	0.595	pCi/g	07/11/18 03:27	08/01/18 20:28	1

**Client Sample ID: PE2-RSYE1-U8-S013****Lab Sample ID: 160-29332-13**

Date Collected: 06/29/18 10:32

Matrix: Solid

Date Received: 07/05/18 08:40

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.437</b>		0.168	0.174		0.103	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Actinium-227	-0.365	U	0.862	0.863		0.697	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Bismuth-212	-0.492	U	0.967	0.968		0.760	pCi/g	07/11/18 03:27	08/01/18 20:28	1

# Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

**Client Sample ID: PE2-RSYE1-U8-S013****Lab Sample ID: 160-29332-13**

Date Collected: 06/29/18 10:32

Matrix: Solid

Date Received: 07/05/18 08:40

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.454		0.118	0.128		0.0290	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Cesium-137	0.0244	U	0.0476	0.0477	0.0700	0.0362	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Cobalt-60	0.0126	U	0.0456	0.0456	0.200	0.0527	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Lead-210	-0.379	U	1.43	1.44		1.20	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Lead-212</b>	<b>0.307</b>		0.0863	0.0950		0.0521	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Lead-214</b>	<b>0.438</b>		0.0950	0.105		0.0310	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Potassium-40</b>	<b>11.0</b>		1.59	1.95		0.245	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Protactinium-231	0.622	U	2.10	2.10		1.70	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Radium-226</b>	<b>0.454</b>		0.118	0.128	0.700	0.0290	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Radium-228</b>	<b>0.437</b>		0.168	0.174		0.103	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Thallium-208</b>	<b>0.149</b>		0.0646	0.0664		0.0291	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Thorium-228</b>	<b>0.307</b>		0.0863	0.0950		0.0521	pCi/g	07/11/18 03:27	08/01/18 20:28	1
<b>Thorium-232</b>	<b>0.437</b>		0.168	0.174		0.103	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Thorium-234	0.379	U	1.09	1.09		0.882	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Uranium-235	-0.0447	U	0.0749	0.0750		0.420	pCi/g	07/11/18 03:27	08/01/18 20:28	1
Uranium-238	0.379	U	1.09	1.09		0.882	pCi/g	07/11/18 03:27	08/01/18 20:28	1

**Client Sample ID: PE2-RSYE1-U8-S014****Lab Sample ID: 160-29332-14**

Date Collected: 06/29/18 10:36

Matrix: Solid

Date Received: 07/05/18 08:40

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.326		0.190	0.193		0.174	pCi/g	07/11/18 03:27	08/01/18 20:29	1
Actinium-227	-0.247	U	0.906	0.906		0.735	pCi/g	07/11/18 03:27	08/01/18 20:29	1
Bismuth-212	-0.426	U	1.15	1.15		0.919	pCi/g	07/11/18 03:27	08/01/18 20:29	1
<b>Bismuth-214</b>	<b>0.403</b>		0.136	0.142		0.0482	pCi/g	07/11/18 03:27	08/01/18 20:29	1
Cesium-137	-0.0751	U	0.0929	0.0932	0.0700	0.0790	pCi/g	07/11/18 03:27	08/01/18 20:29	1
Cobalt-60	-0.0442	U	0.0465	0.0468	0.200	0.0591	pCi/g	07/11/18 03:27	08/01/18 20:29	1
<b>Lead-210</b>	<b>1.69</b>		1.37	1.38		0.789	pCi/g	07/11/18 03:27	08/01/18 20:29	1
<b>Lead-212</b>	<b>0.556</b>		0.152	0.168		0.0986	pCi/g	07/11/18 03:27	08/01/18 20:29	1
<b>Lead-214</b>	<b>0.496</b>		0.115	0.126		0.0394	pCi/g	07/11/18 03:27	08/01/18 20:29	1
<b>Potassium-40</b>	<b>12.8</b>		1.93	2.33		0.302	pCi/g	07/11/18 03:27	08/01/18 20:29	1
Protactinium-231	0.000	U	0.662	0.662		2.48	pCi/g	07/11/18 03:27	08/01/18 20:29	1
<b>Radium-226</b>	<b>0.403</b>		0.136	0.142	0.700	0.0482	pCi/g	07/11/18 03:27	08/01/18 20:29	1
<b>Radium-228</b>	<b>0.326</b>		0.190	0.193		0.174	pCi/g	07/11/18 03:27	08/01/18 20:29	1
<b>Thallium-208</b>	<b>0.241</b>		0.0675	0.0720		0.0174	pCi/g	07/11/18 03:27	08/01/18 20:29	1
<b>Thorium-228</b>	<b>0.556</b>		0.152	0.168		0.0986	pCi/g	07/11/18 03:27	08/01/18 20:29	1
<b>Thorium-232</b>	<b>0.326</b>		0.190	0.193		0.174	pCi/g	07/11/18 03:27	08/01/18 20:29	1
<b>Thorium-234</b>	<b>1.02</b>		1.24	1.24		0.781	pCi/g	07/11/18 03:27	08/01/18 20:29	1
Uranium-235	-0.0649	U	0.351	0.351		0.523	pCi/g	07/11/18 03:27	08/01/18 20:29	1
<b>Uranium-238</b>	<b>1.02</b>		1.24	1.24		0.781	pCi/g	07/11/18 03:27	08/01/18 20:29	1

# Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

**Client Sample ID: PE2-RSYE1-U8-S015****Lab Sample ID: 160-29332-15**

Date Collected: 06/29/18 10:40

Matrix: Solid

Date Received: 07/05/18 08:40

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.811</b>		0.189	0.206		0.0255	pCi/g	07/11/18 03:27	08/01/18 20:27	1
Actinium-227	0.253	U	0.699	0.699		0.564	pCi/g	07/11/18 03:27	08/01/18 20:27	1
Bismuth-212	0.000	U	0.549	0.549		0.590	pCi/g	07/11/18 03:27	08/01/18 20:27	1
<b>Bismuth-214</b>	<b>0.495</b>		0.132	0.142		0.0507	pCi/g	07/11/18 03:27	08/01/18 20:27	1
Cesium-137	-0.0198	U	0.0497	0.0497	0.0700	0.0471	pCi/g	07/11/18 03:27	08/01/18 20:27	1
<b>Cobalt-60</b>	<b>0.0259</b>		0.0424	0.0424	0.200	0.0245	pCi/g	07/11/18 03:27	08/01/18 20:27	1
Lead-210	0.700	U	1.34	1.34		1.07	pCi/g	07/11/18 03:27	08/01/18 20:27	1
<b>Lead-212</b>	<b>0.463</b>		0.0896	0.108		0.0441	pCi/g	07/11/18 03:27	08/01/18 20:27	1
<b>Lead-214</b>	<b>0.540</b>		0.101	0.116		0.0455	pCi/g	07/11/18 03:27	08/01/18 20:27	1
<b>Potassium-40</b>	<b>10.6</b>		1.40	1.77		0.274	pCi/g	07/11/18 03:27	08/01/18 20:27	1
Protactinium-231	0.000	U	0.540	0.540		2.19	pCi/g	07/11/18 03:27	08/01/18 20:27	1
<b>Radium-226</b>	<b>0.495</b>		0.132	0.142	0.700	0.0507	pCi/g	07/11/18 03:27	08/01/18 20:27	1
<b>Radium-228</b>	<b>0.811</b>		0.189	0.206		0.0255	pCi/g	07/11/18 03:27	08/01/18 20:27	1
<b>Thallium-208</b>	<b>0.233</b>		0.0521	0.0574		0.0117	pCi/g	07/11/18 03:27	08/01/18 20:27	1
<b>Thorium-228</b>	<b>0.463</b>		0.0896	0.108		0.0441	pCi/g	07/11/18 03:27	08/01/18 20:27	1
<b>Thorium-232</b>	<b>0.811</b>		0.189	0.206		0.0255	pCi/g	07/11/18 03:27	08/01/18 20:27	1
Thorium-234	-0.127	U	1.37	1.37		1.12	pCi/g	07/11/18 03:27	08/01/18 20:27	1
Uranium-235	-0.206	U	0.412	0.412		0.475	pCi/g	07/11/18 03:27	08/01/18 20:27	1
Uranium-238	-0.127	U	1.37	1.37		1.12	pCi/g	07/11/18 03:27	08/01/18 20:27	1

**Client Sample ID: PE2-RSYE1-U8-S016****Lab Sample ID: 160-29332-16**

Date Collected: 06/29/18 10:43

Matrix: Solid

Date Received: 07/05/18 08:40

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.702</b>		0.213	0.224		0.116	pCi/g	07/11/18 03:27	08/01/18 20:24	1
Actinium-227	0.0460	U	1.01	1.01		0.828	pCi/g	07/11/18 03:27	08/01/18 20:24	1
Bismuth-212	-0.340	U	1.06	1.06		0.845	pCi/g	07/11/18 03:27	08/01/18 20:24	1
<b>Bismuth-214</b>	<b>0.609</b>		0.187	0.197		0.0750	pCi/g	07/11/18 03:27	08/01/18 20:24	1
Cesium-137	-0.0312	U	0.0762	0.0763	0.0700	0.0598	pCi/g	07/11/18 03:27	08/01/18 20:24	1
Cobalt-60	0.0156	U	0.0551	0.0551	0.200	0.0337	pCi/g	07/11/18 03:27	08/01/18 20:24	1
Lead-210	-1.01	U	2.30	2.30		1.93	pCi/g	07/11/18 03:27	08/01/18 20:24	1
<b>Lead-212</b>	<b>0.504</b>		0.120	0.131		0.0658	pCi/g	07/11/18 03:27	08/01/18 20:24	1
<b>Lead-214</b>	<b>0.446</b>		0.125	0.133		0.0721	pCi/g	07/11/18 03:27	08/01/18 20:24	1
<b>Potassium-40</b>	<b>11.9</b>		1.71	2.09		0.143	pCi/g	07/11/18 03:27	08/01/18 20:24	1
Protactinium-231	0.000	U	0.593	0.593		2.66	pCi/g	07/11/18 03:27	08/01/18 20:24	1
<b>Radium-226</b>	<b>0.609</b>		0.187	0.197	0.700	0.0750	pCi/g	07/11/18 03:27	08/01/18 20:24	1
<b>Radium-228</b>	<b>0.702</b>		0.213	0.224		0.116	pCi/g	07/11/18 03:27	08/01/18 20:24	1
<b>Thallium-208</b>	<b>0.281</b>		0.0806	0.0855		0.0247	pCi/g	07/11/18 03:27	08/01/18 20:24	1
<b>Thorium-228</b>	<b>0.504</b>		0.120	0.131		0.0658	pCi/g	07/11/18 03:27	08/01/18 20:24	1
<b>Thorium-232</b>	<b>0.702</b>		0.213	0.224		0.116	pCi/g	07/11/18 03:27	08/01/18 20:24	1
Thorium-234	-0.223	U	1.76	1.76		1.45	pCi/g	07/11/18 03:27	08/01/18 20:24	1
Uranium-235	0.213	U	0.509	0.510		0.488	pCi/g	07/11/18 03:27	08/01/18 20:24	1
Uranium-238	-0.223	U	1.76	1.76		1.45	pCi/g	07/11/18 03:27	08/01/18 20:24	1

# Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

**Client Sample ID: PE2-RSYE1-U8-S017****Lab Sample ID: 160-29332-17**

Matrix: Solid

Date Collected: 06/29/18 10:47

Date Received: 07/05/18 08:40

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.707</b>		0.209	0.221		0.0358	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Actinium-227	0.249	U	0.680	0.681		0.459	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Bismuth-212	-0.0186	U	0.570	0.570		0.642	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Bismuth-214</b>	<b>0.456</b>		0.151	0.158		0.0543	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Cesium-137	-0.0422	U	0.0751	0.0752	0.0700	0.0580	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Cobalt-60	-0.0175	U	0.0714	0.0714	0.200	0.0468	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Lead-210	-0.172	U	1.61	1.61		1.15	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Lead-212</b>	<b>0.308</b>		0.101	0.108		0.0624	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Lead-214</b>	<b>0.425</b>		0.145	0.152		0.0663	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Potassium-40</b>	<b>10.7</b>		1.66	1.99		0.271	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Protactinium-231	-0.813	U	2.04	2.04		1.64	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Radium-226</b>	<b>0.456</b>		0.151	0.158	0.700	0.0543	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Radium-228</b>	<b>0.707</b>		0.209	0.221		0.0358	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Thallium-208</b>	<b>0.187</b>		0.0646	0.0674		0.0225	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Thorium-228</b>	<b>0.308</b>		0.101	0.108		0.0624	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Thorium-232</b>	<b>0.707</b>		0.209	0.221		0.0358	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Thorium-234	0.544	U	0.402	0.406		0.649	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Uranium-235	0.117	U	0.327	0.327		0.275	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Uranium-238	0.544	U	0.402	0.406		0.649	pCi/g	07/11/18 03:27	08/01/18 20:26	1

**Client Sample ID: PE2-RSYE1-U8-S018****Lab Sample ID: 160-29332-18**

Matrix: Solid

Date Collected: 06/29/18 10:50

Date Received: 07/05/18 08:40

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.541</b>		0.177	0.185		0.0875	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Actinium-227	-0.341	U	0.864	0.865		0.553	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Bismuth-212	0.382	U	0.897	0.898		0.700	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Bismuth-214</b>	<b>0.404</b>		0.144	0.150		0.0542	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Cesium-137	0.000	U	0.0174	0.0174	0.0700	0.0547	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Cobalt-60	-0.0918	U	0.144	0.144	0.200	0.0731	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Lead-210	0.0671	U	1.70	1.70		1.38	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Lead-212</b>	<b>0.391</b>		0.105	0.117		0.0583	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Lead-214</b>	<b>0.512</b>		0.123	0.134		0.0858	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Potassium-40</b>	<b>11.6</b>		1.82	2.17		0.256	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Protactinium-231	0.000	U	0.390	0.390		2.43	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Radium-226</b>	<b>0.404</b>		0.144	0.150	0.700	0.0542	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Radium-228</b>	<b>0.541</b>		0.177	0.185		0.0875	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Thallium-208</b>	<b>0.200</b>		0.0610	0.0644		0.0146	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Thorium-228</b>	<b>0.391</b>		0.105	0.117		0.0583	pCi/g	07/11/18 03:27	08/01/18 20:26	1
<b>Thorium-232</b>	<b>0.541</b>		0.177	0.185		0.0875	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Thorium-234	0.356	U	1.76	1.76		1.43	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Uranium-235	0.163	U	0.495	0.496		0.437	pCi/g	07/11/18 03:27	08/01/18 20:26	1
Uranium-238	0.356	U	1.76	1.76		1.43	pCi/g	07/11/18 03:27	08/01/18 20:26	1

# QC Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

## Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-374451/13-A

Matrix: Solid

Analysis Batch: 378547

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 374451

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Total Beta Strontium	-0.01197	U	0.0505	0.0505	0.331	0.0428	pCi/g	07/09/18 09:31	07/27/18 11:28	1
<b>Carrier</b>										
Sr Carrier	91.3			40 - 110				07/09/18 09:31	07/27/18 11:28	1

Lab Sample ID: LCS 160-374451/1-A

Matrix: Solid

Analysis Batch: 378547

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 374451

Analyte	Spike		LCS Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec.	Limits
	Spiked	Added									
Total Beta Strontium		8.22		8.535		0.680	0.331	0.0443	pCi/g	104	75 - 125
<b>Carrier</b>											
Sr Carrier	92.7			40 - 110							

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-374825/1-A

Matrix: Solid

Analysis Batch: 379550

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 374825

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Actinium 228	0.1184		0.147	0.147		0.0913	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Actinium-227	-0.05935	U	0.133	0.133		0.688	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Bismuth-212	0.4575	U	1.12	1.13		0.887	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Bismuth-214	0.02623	U	0.0214	0.0216		0.209	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Cesium-137	-0.04146	U	0.0738	0.0739	0.0700	0.0563	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Cobalt-60	0.005103	U	0.0331	0.0331	0.200	0.0157	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Lead-210	0.7808	U	1.43	1.43		1.03	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Lead-212	-0.01200	U	0.0955	0.0956		0.0788	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Lead-214	0.1011		0.0909	0.0914		0.0599	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Potassium-40	0.2718	U	0.849	0.849		0.388	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Protactinium-231	0.0000	U	0.538	0.538		2.11	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Radium-226	0.02623	U	0.0214	0.0216	0.700	0.209	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Radium-228	0.1184		0.147	0.147		0.0913	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Thallium-208	0.007248	U	0.0386	0.0386		0.0211	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Thorium-228	-0.01200	U	0.0955	0.0956		0.0788	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Thorium-232	0.1184		0.147	0.147		0.0913	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Thorium-234	-0.9989	U	1.16	1.17		1.30	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Uranium-235	-0.2701	U	0.411	0.412		0.576	pCi/g	07/11/18 03:27	08/01/18 19:16	1
Uranium-238	-0.9989	U	1.16	1.17		1.30	pCi/g	07/11/18 03:27	08/01/18 19:16	1

# QC Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-374825/2-A

Matrix: Solid

Analysis Batch: 379559

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 374825

Analyte	Spike Added	LCS		Uncert. (2σ+/-)	Total		%Rec.	Limits
		Result	Qual		LOQ	DLC		
Americium-241	96.8	96.63		10.1		0.470	pCi/g	100 87 - 116
Cesium-137	28.2	27.01		2.87	0.0700	0.0854	pCi/g	96 87 - 120
Cobalt-60	12.9	12.05		1.25	0.200	0.0373	pCi/g	93 87 - 115

Lab Sample ID: 160-29332-1 DU

Matrix: Solid

Analysis Batch: 379559

Client Sample ID: PE2-RSYE1-U8-S001

Prep Type: Total/NA

Prep Batch: 374825

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	Limit
Actinium 228	0.497		0.4939		0.164		0.135	pCi/g	0.01	1
Actinium-227	0.106	U	0.2356	U	0.655		0.528	pCi/g	0.15	1
Bismuth-212	0.229	U	0.1633	U	0.751		0.606	pCi/g	0.04	1
Bismuth-214	0.486		0.4124		0.119		0.0443	pCi/g	0.29	1
Cesium-137	-0.0481	U	0.004232	U	0.0657	0.0700	0.0538	pCi/g	0.28	1
Cobalt-60	0.0302	U	-0.00511	U	0.0110	0.200	0.0402	pCi/g	1.04	1
Lead-210	1.35		0.5351	U	1.26		1.01	pCi/g	0.29	1
Lead-212	0.438		0.3899		0.0926		0.0352	pCi/g	0.23	1
Lead-214	0.563		0.5565		0.114		0.0459	pCi/g	0.02	1
Potassium-40	11.4		11.25		1.82		0.265	pCi/g	0.05	1
Protactinium-231	0.490	U	-0.7934	U	2.49		2.02	pCi/g	0.28	1
Radium-226	0.486		0.4124		0.119	0.700	0.0443	pCi/g	0.29	1
Radium-228	0.497		0.4939		0.164		0.135	pCi/g	0.01	1
Thallium-208	0.108		0.1974		0.0719		0.0276	pCi/g	0.50	1
Thorium-228	0.438		0.3899		0.0926		0.0352	pCi/g	0.23	1
Thorium-232	0.497		0.4939		0.164		0.135	pCi/g	0.01	1
Thorium-234	-0.418	U	0.0000	U	0.742		1.13	pCi/g	0.19	1
Uranium-235	-0.0105	U	0.1544	U	0.334		0.279	pCi/g	0.42	1
Uranium-238	-0.418	U	0.0000	U	0.742		1.13	pCi/g	0.19	1

# QC Association Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

**Rad****Leach Batch: 374214**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29332-1	PE2-RSYE1-U8-S001	Total/NA	Solid	Dry and Grind	
160-29332-2	PE2-RSYE1-U8-S002	Total/NA	Solid	Dry and Grind	
160-29332-3	PE2-RSYE1-U8-S003	Total/NA	Solid	Dry and Grind	
160-29332-4	PE2-RSYE1-U8-S004	Total/NA	Solid	Dry and Grind	
160-29332-5	PE2-RSYE1-U8-S005	Total/NA	Solid	Dry and Grind	
160-29332-6	PE2-RSYE1-U8-S006	Total/NA	Solid	Dry and Grind	
160-29332-7	PE2-RSYE1-U8-S007	Total/NA	Solid	Dry and Grind	
160-29332-8	PE2-RSYE1-U8-S008	Total/NA	Solid	Dry and Grind	
160-29332-9	PE2-RSYE1-U8-S009	Total/NA	Solid	Dry and Grind	
160-29332-10	PE2-RSYE1-U8-S010	Total/NA	Solid	Dry and Grind	
160-29332-11	PE2-RSYE1-U8-S011	Total/NA	Solid	Dry and Grind	
160-29332-12	PE2-RSYE1-U8-S012	Total/NA	Solid	Dry and Grind	
160-29332-13	PE2-RSYE1-U8-S013	Total/NA	Solid	Dry and Grind	
160-29332-14	PE2-RSYE1-U8-S014	Total/NA	Solid	Dry and Grind	
160-29332-15	PE2-RSYE1-U8-S015	Total/NA	Solid	Dry and Grind	
160-29332-16	PE2-RSYE1-U8-S016	Total/NA	Solid	Dry and Grind	
160-29332-17	PE2-RSYE1-U8-S017	Total/NA	Solid	Dry and Grind	
160-29332-18	PE2-RSYE1-U8-S018	Total/NA	Solid	Dry and Grind	
160-29332-1 DU	PE2-RSYE1-U8-S001	Total/NA	Solid	Dry and Grind	

**Prep Batch: 374451**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29332-1	PE2-RSYE1-U8-S001	Total/NA	Solid	DPS-0	374214
160-29332-11	PE2-RSYE1-U8-S011	Total/NA	Solid	DPS-0	374214
MB 160-374451/13-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-374451/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

**Prep Batch: 374825**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29332-1	PE2-RSYE1-U8-S001	Total/NA	Solid	Fill_Geo-21	374214
160-29332-2	PE2-RSYE1-U8-S002	Total/NA	Solid	Fill_Geo-21	374214
160-29332-3	PE2-RSYE1-U8-S003	Total/NA	Solid	Fill_Geo-21	374214
160-29332-4	PE2-RSYE1-U8-S004	Total/NA	Solid	Fill_Geo-21	374214
160-29332-5	PE2-RSYE1-U8-S005	Total/NA	Solid	Fill_Geo-21	374214
160-29332-6	PE2-RSYE1-U8-S006	Total/NA	Solid	Fill_Geo-21	374214
160-29332-7	PE2-RSYE1-U8-S007	Total/NA	Solid	Fill_Geo-21	374214
160-29332-8	PE2-RSYE1-U8-S008	Total/NA	Solid	Fill_Geo-21	374214
160-29332-9	PE2-RSYE1-U8-S009	Total/NA	Solid	Fill_Geo-21	374214
160-29332-10	PE2-RSYE1-U8-S010	Total/NA	Solid	Fill_Geo-21	374214
160-29332-11	PE2-RSYE1-U8-S011	Total/NA	Solid	Fill_Geo-21	374214
160-29332-12	PE2-RSYE1-U8-S012	Total/NA	Solid	Fill_Geo-21	374214
160-29332-13	PE2-RSYE1-U8-S013	Total/NA	Solid	Fill_Geo-21	374214
160-29332-14	PE2-RSYE1-U8-S014	Total/NA	Solid	Fill_Geo-21	374214
160-29332-15	PE2-RSYE1-U8-S015	Total/NA	Solid	Fill_Geo-21	374214
160-29332-16	PE2-RSYE1-U8-S016	Total/NA	Solid	Fill_Geo-21	374214
160-29332-17	PE2-RSYE1-U8-S017	Total/NA	Solid	Fill_Geo-21	374214
160-29332-18	PE2-RSYE1-U8-S018	Total/NA	Solid	Fill_Geo-21	374214
MB 160-374825/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-374825/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-29332-1 DU	PE2-RSYE1-U8-S001	Total/NA	Solid	Fill_Geo-21	374214

**Tracer/Carrier Summary**

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29332-2

**Method: 905.0 - Total Beta Strontium (GFPC)****Matrix: Solid****Prep Type: Total/NA****Percent Yield (Acceptance Limits)**

<b>Lab Sample ID</b>	<b>Client Sample ID</b>	<b>Sr Carrier (40-110)</b>										
160-29332-1	PE2-RSYE1-U8-S001	91.4										
160-29332-11	PE2-RSYE1-U8-S011	97.8										
LCS 160-374451/1-A	Lab Control Sample	92.7										
MB 160-374451/13-A	Method Blank	91.3										

**Tracer/Carrier Legend**

Sr Carrier = Sr Carrier

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